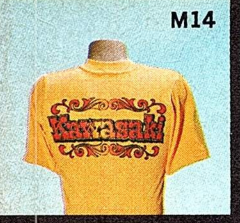
SUPERCYCLE SHIRTS

NOW DESIGN SHIRTS

M14


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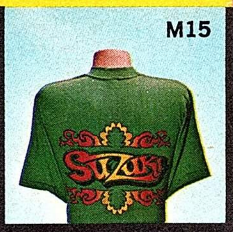

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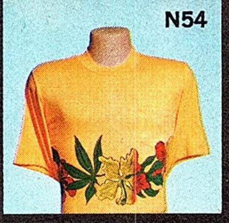

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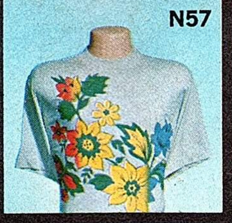

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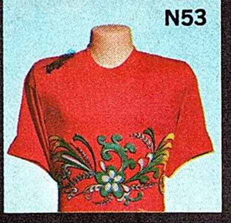

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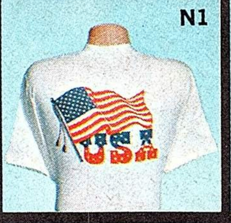

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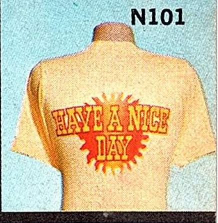

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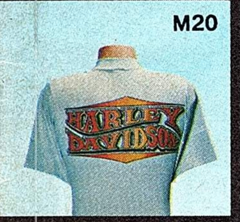

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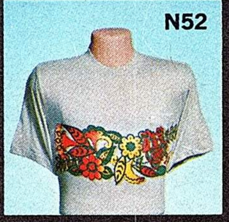

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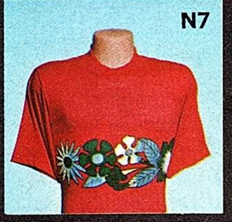

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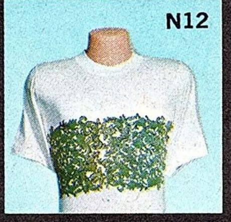

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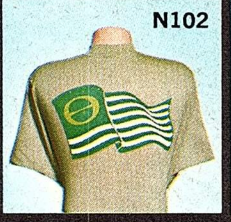

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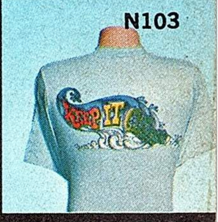

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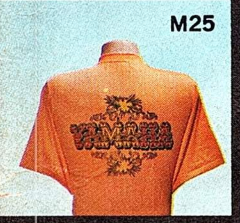

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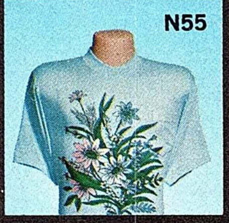

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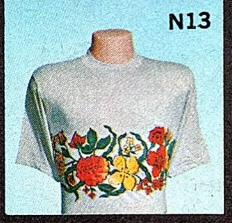

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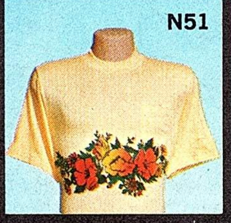

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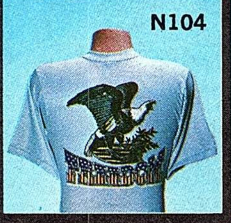

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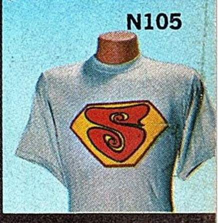

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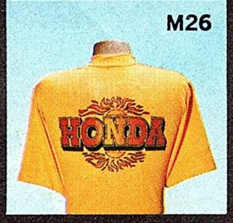

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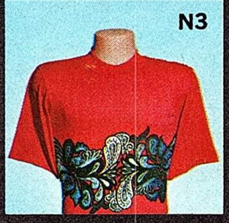

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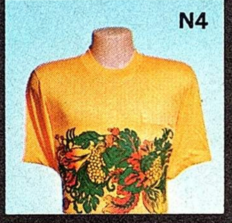

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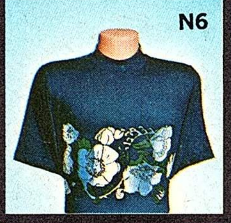

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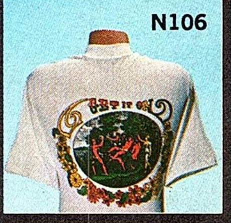

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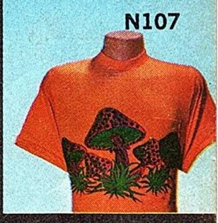

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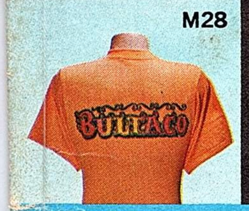

Also Available (Super Cycle Shirts)
M17 Montesa
M18 Husqvarna
M19 Penton M32 Ducati
M21 Maico M34 Jawa-CZ
M22 Norton M35 BMW
M23 Greeves M36 Moto-Guzzi
M27 Hodaka M37 Bridgestone
M28 Bultaco M28 Benelli
M29 Sachs
M30 American Eagle
M31 Royal Enfield

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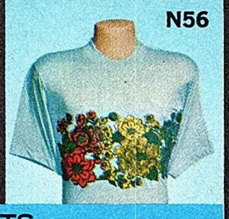

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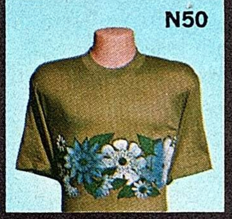

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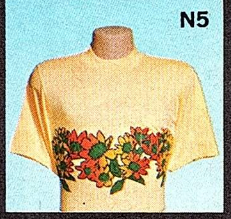

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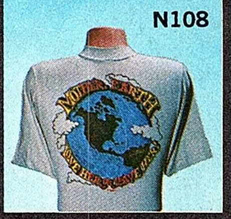

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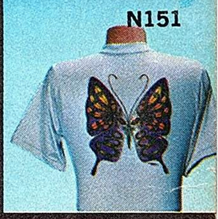
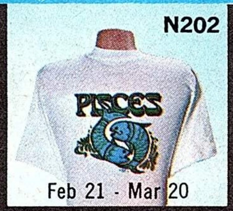


NEW ZODIAC SHIRTS

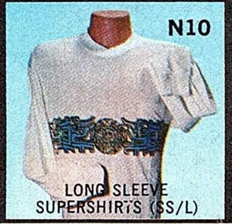
N201

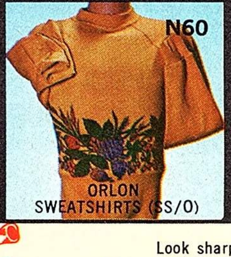
Jan 21 - Feb 20

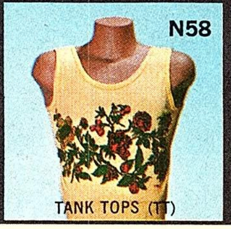
N202

Feb 21 - Mar 20

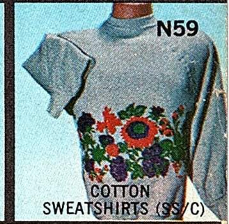
N203

Mar 21 - Apr 20

N10

LONG SLEEVE SUPERSHIRTS (SS/L)

N60

ORLON SWEATSHIRTS (SS/O)

N58

TANK TOPS (TT)

N59

COTTON SWEATSHIRTS (SS/C)

N204

Apr 21 - May 20

N205

May 21 - Jun 20

N206

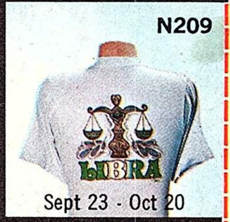
Jun 21 - Jul 20

N207

Jul 21 - Aug 21

N208

Aug 22 - Sept 22

N209

Sept 23 - Oct 20

N210

Oct 21 - Nov 20

N211

Nov 21 - Dec 20

N212

Dec 21 - Jan 20

Shirt Shack

Look sharp in a Supershirt from the Shirt Shack. Brilliant colors, exciting designs. Machine washable. Vibrant colors are guaranteed to stay bright. All designs available on five different types of shirts: SUPERSHIRTS (SS) — Finest quality T-shirt with high-crew neckband, sport shirt length sleeves, breast pocket. LONG SLEEVE SUPERSHIRTS (SS/L) — Same as the Supershirt, with full length sleeves and knitted cuffs. COTTON SWEATSHIRTS (SS/C) — Cotton blend with raglan shoulders, long sleeves. ORLON SWEATSHIRTS (SS/O) — Finest quality Orlon shirts. Will not shrink. TANK TOPS (TT) — Popular for beach and sports wear. All shirts (except Orlon) available in nine colors: white, green, lt. blue, orange, yellow, red, navy, gray or tan. Orlon in red, navy, green or tan.

SHIRT SHACK, P. O. Box 519, Dana Point, California 92629. Send me items checked below. CW-6

TYPES AND PRICES OF SHIRTS

TYPES	Now Designs & Zodiac	Supercycle Shirts
Super Shirt Short Sleeve (SS)	4.00	3.50
Sweatshirt Cotton Blend (SS/C)	6.00	5.50
Sweatshirt 100% Orlon (SS/O)	7.45	6.95
Super Shirt Long Sleeve (SS/L)	5.00	4.50
Tank Top (TT) 100% Cotton	4.00	3.50

Sorry, No COD's, or ''Bill Me's''

Number of Shirts	Type of Shirts	SIZE Sm. - Med. Lg. - X-Lg.	Design Number	COLOR First Choice	Second Choice	PRICE

(Color Substitution May Be Necessary)

Enclosed find $__________ ☐ Cash ☐ Check ☐ Money Order
Prices include handling charges. California residents add 5% sales tax

Name__________
Address__________
City__________ State & Zip Code__________

LETTERS

Continued from page 6

gart, Ramstein, Bremen, Bremerhaven, Berlin, and various other points in Germany.

Almost any of these people will tell or show you the motorcycle dealers, the shops or whatever else you want in the area. You may even like to ride out on any of the frequent "runs" they make in the area.

MIKE FRANCIS
Pirm-Zwei, Germany

ALL WET

Despite its seemingly inexorable growth in the pages of CYCLE WORLD and other motorcycle magazines, the neologism "dampening" serves no useful purpose. The correct technical term, used consistently in the world literature for all of living memory, is "damping." In full, it is "viscous damping" or "rate damping." The precise construction in which this term is used—a construction both mathematical and rhetorical—is "to damp an oscillation," which, according to my *New World*, means "to check or reduce (energy, action, etc.)."

J.G. KROL
Anaheim, Calif.

Our Webster's allows that either damp or dampen may be used interchangeably. Personally, we prefer damp and damping. However, dampen and dampening may be useful to improve the rhythm of a written sentence, and if it don't have rhythm, baby, it's blah. If it have rhythm, it's right on . . .—Ed.

OH, THAT MARCH ISSUE!

Normally I'm not easily influenced by Madison Avenue high pressure advertising, but your March 1971 issue swallowed my 75 cents before I had a chance to peruse it. "World's Biggest Monthly—166 pages" caught my eye and my wallet before I realized what had happened. What I actually purchased was approximately 87 pages of motorcycle "Topical, Technical and Informative" news. The rest was 68 full pages of advertisements and 22 half pages. However, for some strange economical reason, I still purchased a three-year subscription. At least you're doing part of something right.

DENNIS GOERIG
Newfoundland, N.J.

I just started reading your March 1971 issue of CYCLE WORLD. You guys sure have the nerve. On the front cover you state "World's Biggest Monthly—166 pages."

I'll still continue to buy CYCLE WORLD at a local stand. So I'm not really against you. Just so many needless ads.

RON ROARK
Abingdon, Va.

I always admired and read CW because I felt that it was factual, concerned and extremely up-to-date, but to find these same exact qualities costing 50 percent more than they used to is inflation to the *n*th.

In other words, gentlemen, I am trying to say that you have raised the price without increasing the quality of the wares.

RUSSELL STURM
Pompton Plains, N.J.

I am a subscriber to your magazine and I have enjoyed it very, very much.

I am writing to tell you how much I enjoy the road tests and the big centerpiece on Suzukis in your March issue.

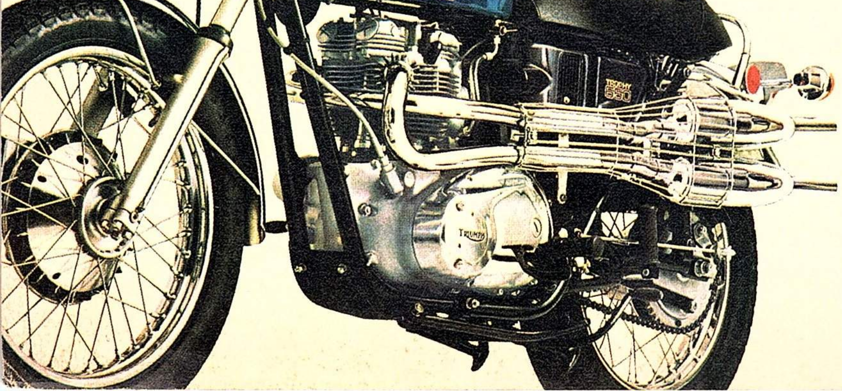
AL GUY
Wetumpka, Ala.

Your price rise is going to have two effects on me. One: I'm going to subscribe. Two: I can't afford to buy (beep-beep) magazine anymore. Incidentally, I don't know of any reason to have bought (beep-beep) magazine in the last year; junk!

ERIC FLODEN
Ottawa, Ontario, Canada

THINK B

The engineering ideas that helped Gene Romero win the AMA Grand National Championship are yours in the 1971 Triumph.



THINK TRIUMPH TROPHY 650-SS.
(TR6C)

Big power made more efficient off road or on. New, double loop frame is lighter weight, but 50% stronger. New, more efficient brakes, with new lightweight hubs.

ENGINE TYPE OHV–4 stroke
CYLINDERS 2
MAX. HP 47 bhp @ 7000 rpm
MAX. TORQUE 36.5 ft. lb. @ 6250 rpm
BORE/STROKE 71 x 82mm
COMP. RATIO 9:1
TRANS. 4-Speed gearbox (TR6C)
CARB. Amal 30mm conc.
F. TIRE Dunlop 3.25 x 19" K70
R. TIRE Dunlop 4.00 x 18" K70
F. BRAKE 8" DLS
R. BRAKE 7" SLS
WHEEL BASE 56"
GND. CLEAR. 7½"
DRY WEIGHT 381 lbs.
FUEL TANK 3½ gals.
OIL 6 pts.

THINK TRIUMPH TIGER 650.
(TR6R)

A twin-cylinder tiger that delivers more performance than ever. Many other new features from megaphone muffler to rubber-mounted instruments and front fender.

ENGINE TYPE OHV–4 stroke
CYLINDERS 2
MAX. HP 47 bhp @ 7000 rpm
MAX. TORQUE 36.5 ft. lb. @ 6250 rpm
BORE/STROKE 71 x 82mm
COMP. RATIO 9:1
TRANS. 4-Speed gearbox (TR6R)
CARB. Amal 30mm conc.
F. TIRE Dunlop 3.25 x 19" K70
R. TIRE Dunlop 4.00 x 18" K70
F. BRAKE 8" DLS
R. BRAKE 7" SLS
WHEEL BASE 56"
GND. CLEAR. 7½"
DRY WEIGHT 381 lbs.
FUEL TANK 3½ gals.
OIL 6 pts.

Only one 90 is as tough as the Suzuki TS-90 Honcho. The Suzuki TC-90 Blazer.

Pick a pair. The best 90's built.

Both with a rugged double cradle tube frame and 11 horsepower.

The TS-90 Honcho, built for enduro riding, has 5 speeds. Black upswept muffler with spark arrester. Long travel forks. CCI automatic lube. Motocross-type handlebars. And an optional "Hop-up" kit that boosts the cc's to 100, the hp to 17.

The TC-90 Blazer, for dirt and street has an 8 speed dual-range transmission. Chrome muffler with spark arrester. Bridge-styled handlebars. CCI automatic lube. And a high clearance front fender.

So, the real question isn't which 90 to buy, but which Suzuki 90.

In the continental U.S., you can find the Suzuki dealer nearest you for free, call: 800-631-4299.

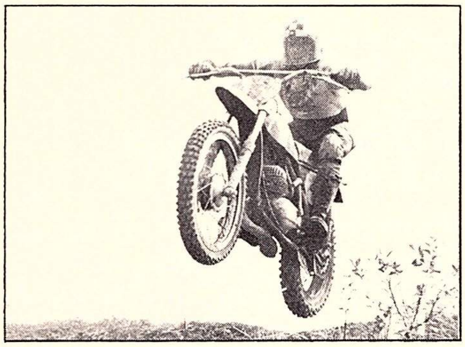
U.S. Suzuki Motor Corporation,
13767 Freeway Drive, Dept. 2010,
Santa Fe Springs, CA 90670.

In Canada: Radco
Sales, Ltd., 1107 Homer St.
Vancouver 3, B.C.

Suzuki: built to take on the country.

RACING REVIEW

Mike Wooden Photos



Left:
John Scales in action on his Bultaco Pursang at Unadilla Valley Sports Center.

Below:
Bob Harris in action on his Bultaco Pursang at Pepperell, Mass., early in the 1970 season.

NEW MOTOCROSS TEAM

A new, independent racing team will mount a serious challenge to the East Coast's established motocross stars in the coming professional racing season. The Cycle Sports Center, a retail motorcycle shop and mail order business in Binghamton, N.Y. has contracted the services of two riders and a team manager/tuner to form a highly organized effort to compete in the professional motocross circuit to date.

The Cycle Sports Center Racing Team began the 1970 motocross season with a loose organization of rookie riders and management. The team competed in every event of last year's Can-Am Series and contested five International events including the Inter-Ams of Copetown, Ont. and Pepperell, Mass., and the Unadilla, N.Y. Trans-AMA event. Two outstanding results from last season's efforts were an overall win in the Open support class at the July international event at Unadilla, N.Y., and a win in the 250cc Expert class at the Gold Cup Championship at the Central Pennsylvania Motocross Park in State College, Pa., by team rider Bob Harris. Three trucks used by the team last season covered more than 45,000 miles in New York, New England, Pennsylvania, and Canada.

Last year's team star, 18-year-old Bob Harris of Windsor, N.Y., has been

(Continued on page 14)

NEW! TRAIL-A-BIKE NEW!
"The only way to tow"
AMERICA'S NO. 1 MOTORCYCLE TOWING DEVICE

Single Unit
ONLY
$32.95
Including Lights

- LEGAL IN ALL STATES
- 1/3 THE COST OF A TRAILER
- NO DRAG – NO TIRE WEAR
- SAFE AT ANY SPEED
- WORKS WHEN OTHERS WONT

FITS MOST ANY TRAILER HITCH WITH ONLY ONE BOLT

DUAL TOWS ONE OR TWO BIKES

Double Unit
ONLY
$64.95
Including Lights

Order Through Your Motorcycle Dealer

Trail-A-Bike, Inc.
221 S. 19TH AVENUE
YAKIMA, WASHINGTON 98902

PAT. NO. 3428332

LITTLE CARS TOW BIG BIKES

This is just one reason why the Suzuki TS-125 Duster outperforms any other 125

A downswept performance tuned exhaust that helps the Duster deliver more power than any 125 made: 13 horses.

But power's not the only reason the Duster is the best 125 going. There's the idea behind it: It's built like an enduro racer.

So it'll take you through almost any kind of terrain.

5 speed gearbox. Bead stoppers. 9.3" ground clearance. Long travel front forks. 5-way adjustable rear shocks. CCI automatic lube. Spark arrester.

The Duster is a bike that will do 70 mph, take a 34° hill. A bike that's ready to take on competition. As is.

What more reason do you need than that?

In the continental U.S., you can find the Suzuki dealer nearest you for free, call: 800-631-4299.

U. S. Suzuki Motor Corporation,
13767 Freeway Drive, Dept. 2003,
Santa Fe Springs, CA 90670.

In Canada: Radco Sales, Ltd.,
1107 Homer St., Vancouver 3, B. C.

SUZUKI

Suzuki: built to take on the country.

☆ G.P. HELMETS ☆
G.P. MEANS — GREATER PROTECTION
(COMPARE FOR SAFETY SAKE)

G.P. HELMET *BRAND X* COULD THIS BE YOU?*

IT'S EASY TO FIND OUT IF IT'S A G.P. FIBERGLASS.
TRY THE HAND TEST — AS INDICATED.
*(G.P. HELMETS) MADE OF LAYERS OF FIBERGLASS TO INSURE MORE SAFETY
WITH A DELUXE SOFT INTERIOR FOR IMPACT AND COMFORT.
*(BRAND X) IS MADE OF CHEMICALS OTHER THAN FIBERGLASS.

G.P. 300 — SUGG. RETAIL $11.99
G.P. 400 — SUGG. RETAIL $13.95
G.P. 500 — SUGG. RETAIL $18.95
G.P. 700 — SUGG. RETAIL $23.95

COLOR METAL FLAKE $1.00 MORE — WHY PAY MORE FOR LESS?
Red, blue, silver, gold GP 300 available in white only

* FOLD-A-WAY MOTORCYCLE CARRIERS AND ACCESSORIES *
(PATENT PENDING)

TIE-DOWN BARS
SUGG. RETAIL
$5.95 Pr.
JUST SLIP IN FOLD AWAY

FOLD-A-WAY CARRIER
SUGG. RETAIL
$17.95 Pr.

DISTRIBUTOR KING • ENTERPRISES, INC. •

EASY LOAD
SUGG. RETAIL
$7.95 SET
EASY INSTALLED

"To order your helmet, please state type, size and color,
or carrier and accessories. Send Postal Money Order only."
DEALERS—DISTRIBUTORS WANTED FOR CATALOG INCLUDING OTHER
FAST MOVING ITEMS AND WHOLESALE PRICES PLEASE WRITE TO:
D. K. ENTERPRISES, INC.
PHONE AREA CODE 206-776-9332
P.O. BOX 511, LYNNWOOD, WASHINGTON 98036

RACING

Continued from page 12

Team manager Mike Kane (center) looks on as John Scales (left) and Bob Harris (right) sign two-year contracts to ride for the Cycle Sports Center Racing Team.

signed to a two-year contract on Cycle Sports Center machines. Harris has a good background in motorcycle competition, having won his local season championship in Amateur sportsman scrambles at 15, and the Expert class championship at age 16. Switching to motocross only last season, Harris made steady progress through the ranks till he won the Open Expert class at last year's Summer International at Unadilla, N.Y. Since that time, Harris has rated as a threat to the established professional stars. His biggest asset is his conservative consistency. Although he is capable of flashy, continental-style showmanship, his performances in important races are aimed strictly at maximum results. Many veteran riders have marveled at his coolness under pressure.

Harris' teammate will be 22-year-old John Scales of Binghamton, N.Y. Scales was a fast rising amateur motocrosser in the 1969 season and made the decision to challenge the professional class during 1970. That season was spent gathering experience in the rough and tumble motocross world. With only two years' racing experience to draw on, it is Scales' determination and excellent physical condition rather than his background that marks him as a dark horse contender in the coming season.

Mike Kane, also of Binghamton, N.Y., has been signed to act as team manager in charge of this effort. Kane feels that his role is what creates a true team of this group, freeing the riders of many petty chores and allowing them to concentrate 100 percent on their riding. Kane will be responsible for the preparation of the Bultaco motorcycles that the team will use in 250cc events.

"The great majority of the 'professionals' in motocross today are simply Amateurs racing for money rather than trophies," he says. "What we are trying to do here is to build an organization that will allow us to make a living from

(Continued on page 16)

The Suzuki TS-185 Sierra. It's a whole new class of off-road machine.

New class in everything: cc's, power, performance.

The Sierra can take a 35° hill. It does 70-75 mph from a 17.5 horsepower engine.

It's one of the very few bikes—in any class! —with both adjustable rear shocks and adjustable front forks. The rear adjusts 5 ways, the front 3.

So in combination you can get 15 different rides from the Sierra. All fast.

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The TS-185 Sierra. About the only way to top it is to get a lot bigger bike.

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Suzuki: built to take on the country.

RACING

Continued from page 14

our competitive efforts. In doing this, we intend to apply every technique of team effort and management to assist our riders in their job."

YAMAHA SIGNS HALLMAN

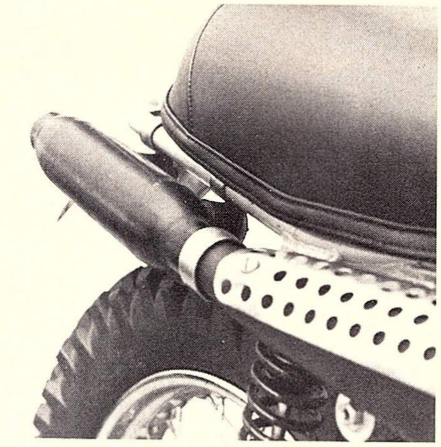
As expected, Torsten Hallman has signed a contract with Yamaha. Serious competition is not expected until 1972, however, as 1971 is planned for a year of prototype testing and development. The Yamaha team will consist of two riders; No. 2 has not yet been disclosed.

Due to the rather late planning, Hallman will not be able to count on top money for all events leading to the championship. As a result, he will more than likely abstain from competing in a few of them.

BONNEVILLE SPEED WEEK

August 22 to 28 are the dates for this year's Bonneville Speed Week according to the AMA, SCTA, and Bonneville Nationals Inc.

Competition at Bonneville is open to anyone. Further information can be obtained by writing Earl Flanders, the AMA referee for motorcycles, at Box 2297d, Pasadena, CA 91105. If you send the details of your bike with the inquiry, he will tell you the class in which it will fall and all the safety requirements that must be met.



MUFFLER CONTINGENCY

In an effort to encourage quieter racing, Norton Villiers Corp. is offering a muffler contingency program.

Any rider of an AJS Stormer in the states of Oregon, Washington, Nevada, Arizona, or California winning his class at a motocross, TT, or enduro event will receive a voucher for $25 worth of parts, irrespective of whether he is novice, junior, or expert.

The award will continue until further notice and is subject to the following conditions:

The machine must be fitted with an AJS muffler, part number 0700054. These are available from all AJS dealers. It should be noted that this muffler was developed on a dynamometer and no power loss is claimed.

The win must be published in *Cycle News* or in *Motor Cycle Weekly,* and riders are not eligible to win more than one $25 voucher per event.

Voucher application forms are available at all AJS Dealers. When completed, they must be sent to Norton Villers Corp. together with the news clipping from one of the weekly papers mentioned above.

HUSQVARNA ENDS ISDT SUPPORT

Husqvarna will not support the ISDT in the future, as they are concentrating all resources on motocross. For quite a long time, the ISDT has been considered by Husqvarna as an occasion for showing a philanthropic spirit, but they have obviously not been able to profit from their rather successful performances.

The Swedish ISDT trophy team for 1971 will ride MCBs in either 175- or 125-cc displacements. MCBs did very well in Spain last year.

Knowing that the task of providing ISDT mounts is in good hands, Husqvarna can concentrate on defeating Suzuki in motocross events without any hard feelings from anyone. ◘

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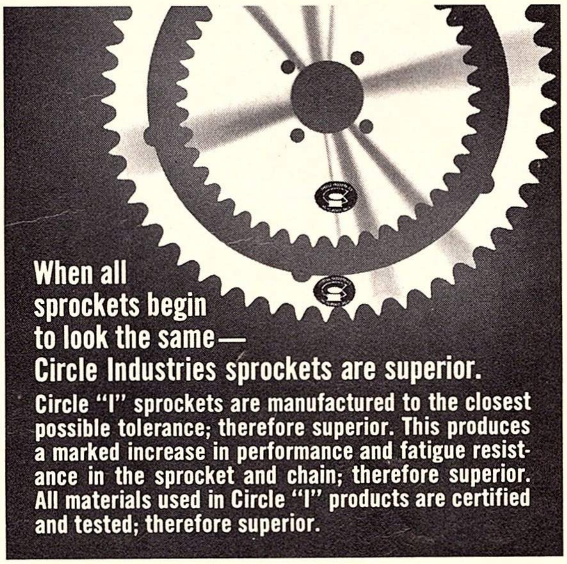
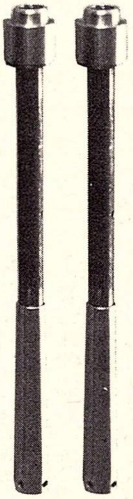


When all sprockets begin to look the same— Circle Industries sprockets are superior.

Circle "I" sprockets are manufactured to the closest possible tolerance; therefore superior. This produces a marked increase in performance and fatigue resistance in the sprocket and chain; therefore superior. All materials used in Circle "I" products are certified and tested; therefore superior.



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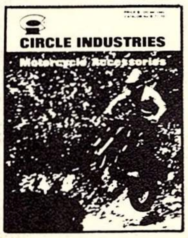
These proven two-way action front fork dampeners increase fork travel 1½" and are easily installed. The action is similar to the Ceriani, but without all the cost. No other accessory fork dampener will control the hydraulic fluid in both up and down directions. Check and metering valves accomplish this control. Made from certified steel, ready for installation with your stock fork springs. Fits Yamaha RT-1, DT-1, CT-1, AT-1.

ONLY $19.95 pair



JUST OUT! **New 1971 Color Catalog —** Motorcycle Accessories, New Products, complete Sprocket Listing, Technical data and hints. Send for your copy today. **$1.00**

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Strong enough to lift a ¾ ton truck; it keeps your cycle secure, never loosening from road vibrations. We urge you to compare SHUR-RELEASE™ features with all other available tie-downs.

SHUR-RELEASE ™ Features:

A Big, strong, 2" wide weather-proof, 6,000 lb. test webbing.

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D High tensile nylon stitching for high strength and long wear. Extended length of nylon webbing gives you 6 ft. tie down distance from hook to hook.

The Suzuki T-350 Rebel outrides any 350 made.

Proof? Pick an area.

Performance: The Rebel has a 40 hp aluminum twin-cylinder engine. It'll do 100-105 mph, turn the quarter in 13.8.

Handling: Oil-dampened suspension, wide-bridge handlebars and 3-way adjustable rear shocks.

Features: It's got a 6-speed gearbox, double-leading shoe front brakes and CCI automatic lube.

And if all that doesn't convince you the Rebel outrides any 350 made, just ride it

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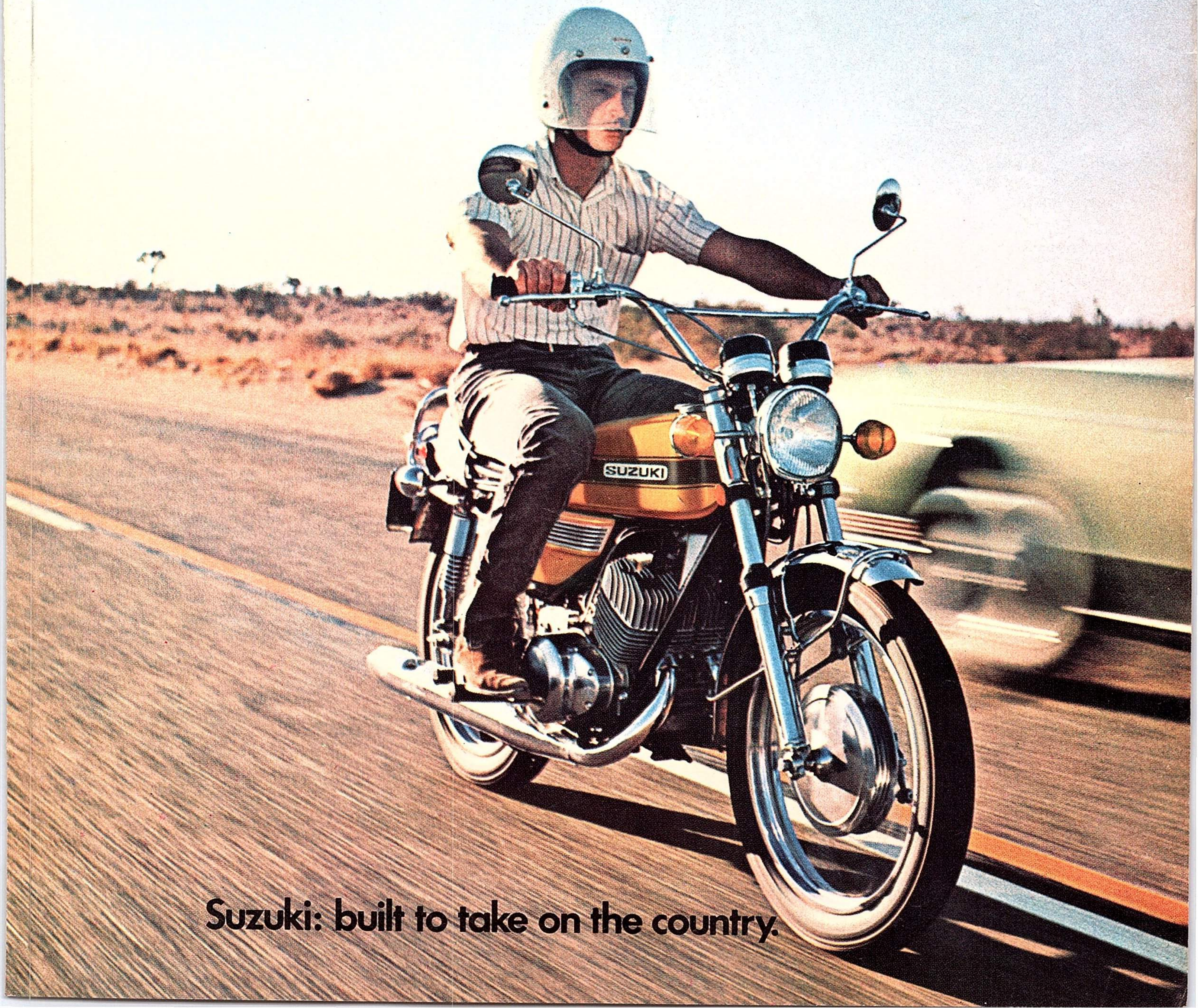

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So why not give yourself a little unfair advantage... tire-up with a new set of Avons at your favorite motorcycle shop.

LETTERS

Continued from page 10

Don Vesco's credit that he did not succumb to your provocation with questions about the "Harley Villains."

It would seem that everyone involved acted in Bonneville's tradition of speed, competition, and sportsmanship except CYCLE WORLD. "Ya done real poor."

PATTY O'BRIEN
APO San Francisco, Calif.

Aw, Patty, where's your sense of humor? Your daddy, the racing chief, didn't seem to mind our tongue-in-cheek treatment of his success on the salt at all, and was rather amused, as was his boss, William H. We like your dad and what he's doing, and we dig Harley-Davidson. To do what they did took guts and determination, and a flair for the dramatic. To jokingly call Dick and crew "record thieves" is our way of complimenting their great effort. And you've got to admit that Calvin is one brave fella'.—Ed.

CUSSING OUT KUSS

Two questions for Officer W.L. Kuss of Southfield, Mich., regarding "Helmet Hoopla," page 20, Feb. '71 issue. Is the wearing of seat belts and shoulder straps in passenger cars compulsory in your state? If not, why not?

Perhaps legislation regarding a minority is quite different than that which affects a majority.

A legislator is a servant of the people. It is his duty to enact laws as desired by the majority of the people. This is usually the procedure in our country, although lately, we seem to be losing a lot of freedom, all for the cause of law and order, and now safety!

This is not to imply that as a rider of 25 years' experience I do not favor helmets. I personally would not be without one, but it is the job of the manufacturers, National Safety Council, cycle dealers, cycle magazines, experienced riders, etc., to sell the goodness of wearing a helmet. The idea that a helmet protects the other driver or innocent bystander is ridiculous and not complimentary to the intelligence of the people or the state's attorney who presents this argument. It is no wonder that many of us lose faith in our legislators and officers who must enforce laws founded and passed on pretense. I'm sorry officer Kuss, but I see it as an intrusion into my freedom and believe our forefathers would also see it thus.

R.E. KRUEGER
Milwaukee, Wis.

Mr. Kuss is attempting to justify Michigan's (and other states') reasoning

(Continued on page 20)

Which is the real you ?

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Yippee! Here's the three-wheeled way to fun everywhere: sand, woods, light snow and even shallow streams. Choose from the hot 2-cycle units or the tamer 4-cycle models—the ones that work like utility vehicles when they're not out sporting around.

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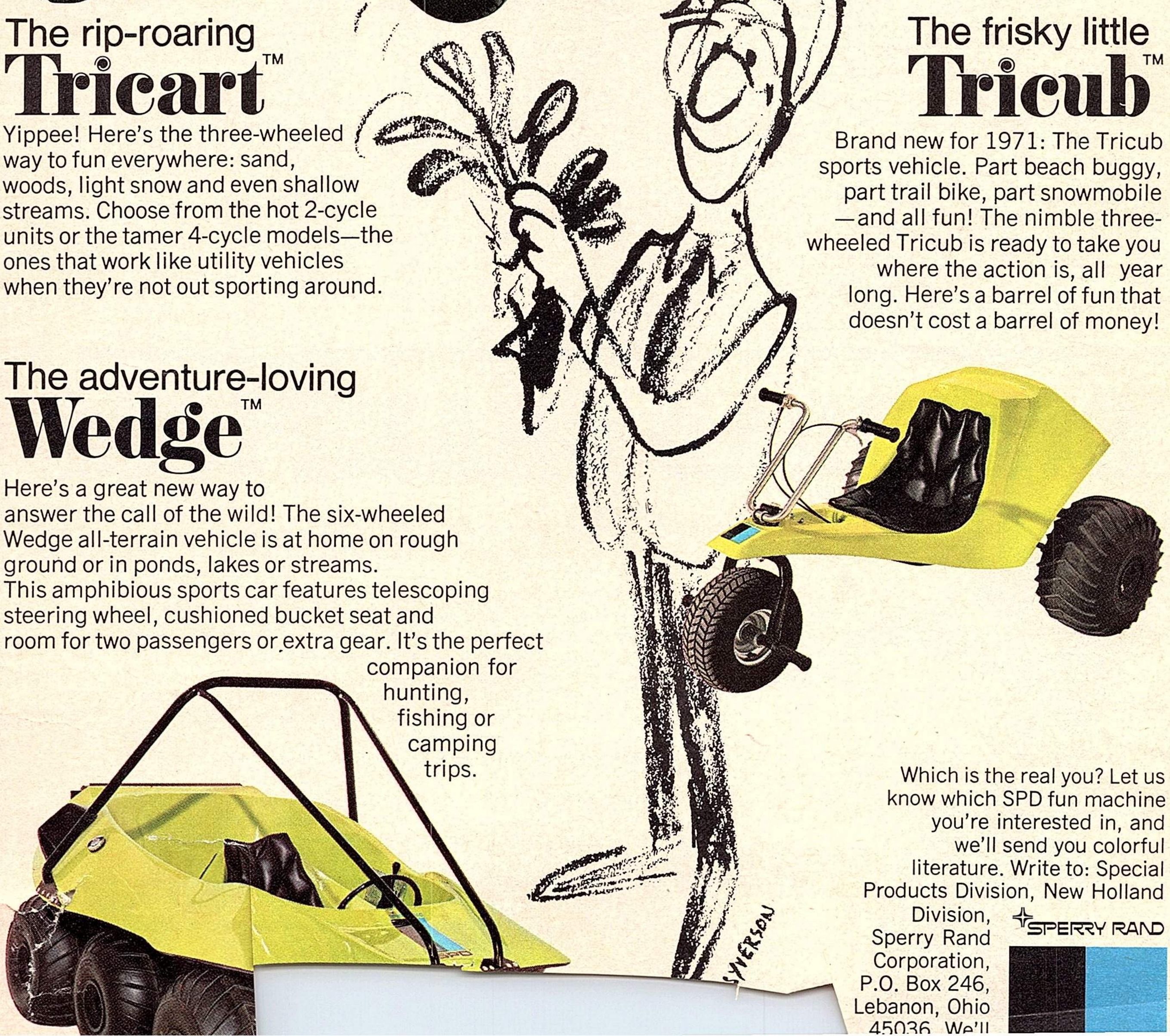
Here's a great new way to answer the call of the wild! The six-wheeled Wedge all-terrain vehicle is at home on rough ground or in ponds, lakes or streams. This amphibious sports car features telescoping steering wheel, cushioned bucket seat and room for two passengers or extra gear. It's the perfect companion for hunting, fishing or camping trips.



Which is the real you? Let us know which SPD fun machine you're interested in, and we'll send you colorful literature. Write to: Special Products Division, New Holland Division, Sperry Rand Corporation, P.O. Box 246, Lebanon, Ohio 45036. We'll

SPERRY RAND

LETTERS

Continued from page 18

that motorcyclists should be forced by law to wear helmets on the grounds that a cyclist "could be stunned by a falling or flying object, thereby causing him to lose control of his machine, veer over the center line . . ." etc., ". . . which could in turn cause . . ." etc., etc.

I was once hit in the face by a cigar tossed from an oncoming car. I have had a few rocks bounced off my shins. I have met quite a few big, fat bugs, but I have never encountered a UFO, and the only time I was ever "stunned" was when I was driving a car and the "safety" windshield blew out in my face at 70 mph.

Come now Mr. Kuss. You spent eight years investigating accidents. How many are on record that were caused by a motorcyclist being stunned by a falling or flying object hitting him on the part of his head that would be covered by a helmet, causing him to veer over the center line, etc.?

No, Mr. Kuss, I am afraid your legislators, like mine, are about as interested in saving lives as I am in the price of horse meat in India. I rather think they are doing their "duty" passing their percentage of federal safety recommendations in order to receive their share of federal highway funds. Motorcycle laws are on top of the list, since they deal with a minority and are therefore easiest to pass. They can even use asinine reasoning, such as the one pointed out by Mr. Kuss, and still get by with it.

Wearing a helmet is a good recommendation, but a bad law. It sets a bad precedent because it has singled out a minority for restrictive legislation of a nature that the majority would not stand for. I consider this type of legislation more dangerous to me than the risk of head injury while riding motorcycles.

For Mr. Kuss, I recommend that he wear a helmet—for his own protection—and also, for his own protection, that he not be so naive about how a legislature works.

C.W. BRAZILLE
Ft. Worth, Texas

When the original Michigan helmet law was held to be unconstitutional, I thought the legislators were acting like immature children in demanding that they get their way by passing a new law stating that if helmets were not worn while riding, they would still have to be carried on the bike at all times.

I'm originally from Illinois, where the helmet law has been repealed, and I'm glad of it. I wear my helmet most of the time when riding, and needed it once, but there are times when I like to enjoy a country ride without it.

Also, in the same issue in "The Service Department," there was an article on non-leaded gas and stellite *tipped* valves. Mr. Nicholas stated that the valves wear faster without lead. This is true because the lead acts as a lubricant between the valve face and valve seat, thus preventing the abrasive-type wear that occurs without lead. However, it should have been noted that the author of the letter meant stellite *faced* valves, which can reduce wear, and are used for this purpose in the new Chevrolet Vega engine. I am familiar with this myself, as I am an automotive engineer in the engine laboratory at International Harvester.

ALAN C. WESLEY
Fort Wayne, Ind.

REBUTTAL TO "CHICKEN LITTLE"

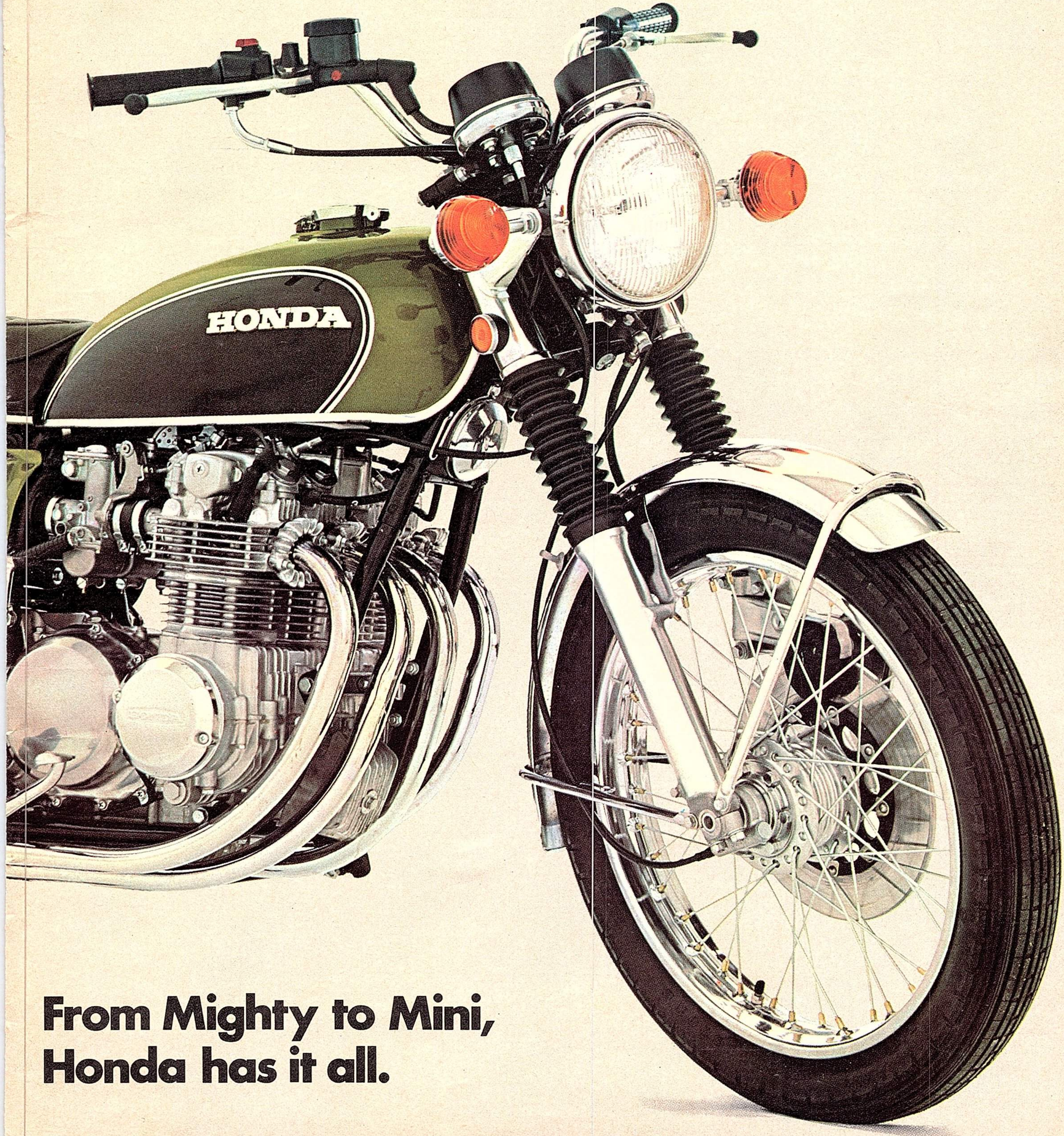
I never make a habit of writing to the editor, but I just couldn't resist this one. Mr. Walter L. Kuss, the Michigan cop, is going a long way around to defend the helmet. He sounds like Chicken Little and "the sky is falling" that I remember as a little boy about 45 years ago. Does Michigan require a helmet on drivers and passengers of convertibles with the top down? Is horseback riding legal in Michigan, and if so, are both the rider of the horse and the horse required to wear

(Continued on page 24)

OFF-ROAD CHAMPIONS

EUROPEAN OFF-ROAD RACING is competition at its hottest for it was in Europe where moto-cross and trials began and where riders and manufacturers have had years to hone their skills to a razor's edge. That's why success in European off-road competition proves so much. And why we are so proud, for example, that EVERY type of off-road championship in Spain this year went to BULTACO!
Ignacio Bulto used the superb handling and the delicate controllability of the Sammy Miller-designed Sherpa T to win the Spanish trials championship.
Jose Sanchez used the power and the high-speed handling capabilities of the Pursang 250 and the El Bandido 360 in capturing the Moto-Cross title.
And Casimiro Verdaguer used the rugged reliability and all-round performance of the Matador 250 to become Enduro Champion of Spain.
Every off-road title in Spain . . . all to Bultaco. No wonder we're proud!

THE INTERNATIONAL SIX DAYS TRIAL is the toughest off-road event of them all . . . the equivalent of the California Hare and Hound or the New England woods enduro every day for a week! You only get gold medals in the ISDT if you finish on time, all the time, and lose no penalty points.
Four Bultaco team riders did it this year. American Gerry Pacholke and his Spanish teammates, Ignacio Bulto, Oriol-Puig Bulto and Casimiro Verdaguer all gained the coveted 'golds'. More proof that Bultaco does what counts when it comes to off-road competition.



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LETTERS

Continued from page 20

helmets? How about all those nice folks who drive their car with the side windows rolled down and then some nasty old sparrow or chicken hawk zooms in through the side window and causes them to lose control and cross over into the wrong lane. I wish I lived in Michigan; I bet it would be a ball. With all those cops eating funny pills, it would be a riot.

I have been riding motorcycles for 37 years and selling them for 31 years, and I have yet to wear a crash helmet on the streets. Maybe I am just lucky, maybe not. The point is that you can't legislate safety much better than you can legislate drinking or sex. There are just some things that man does, legal or illegal, and for a cop to try to rationalize a legislative act as he has done is as ridiculous as Prohibition, and we all know that didn't work. Thanks for the laugh.

WADE LENTNER
Ottumwa, Iowa

GIVING DUE CREDIT

Being an avid reader of your fine magazine, I have watched and read with interest the continuing stream of carping, complaining letters regarding adverse legislation, i.e., helmet laws, crashbars, lights-on-in-daylight, *ad infinitum.*

It has occurred to me that, in spite of the obvious discomfort (not to mention expense) of a hot, heavy and awkward-to-carry helmet, cumbersome and aesthetically displeasing crashbars, and the so-called "ridiculous" lights-on-in-daylight law, each and every one of these laws, is, in reality, a boon to the motorcycling public. It's time we stopped and examined the good that is derived from these laws. (Again, in spite of their real or imagined discomfort.)

For every helmet that prevented a death or serious injury, that's one less glaring headline, one less gathering of an indifferent and apathetic crowd, and one less angry and bereaved parent or loved one. For every crashbar that prevented a broken or lost leg, that's one less "I told you so!" And just how expensive and difficult is it to turn on or replace a headlight bulb? As compared to a life or limb?

As you know, this type of law is not exclusive to the motorcyclist. Witness the case of the water skiers, now having (by law) to wear a life jacket and carry a second person in a tow boat. Is this a "ridiculous" law also?

Obviously, legislators are aware there are problems associated with the riding of motorcycles, and despite their so-called "infinite wisdom," they make mistakes just as we do.

The publishers of this magazine, their advertisers, the manufacturers, and the general motorcycling public would not accept the responsibility of passing laws regarding the spending of federal funds. Why then, do we expect our legislators to pass knowledgeable laws concerning motorcycles? Instead of condemning and complaining about each and every law passed, let's examine them for their potential worth, and give credit to the legislators when an effective law is passed.

Let's show our sense of involvement and responsibility to an ignorant and unknowledgeable legislature by attempting to alleviate their ignorance in matters concerning motorcycles, through education and meaningful comment.

I can't help but feel that we would be doing both them and ourselves an immeasurable service. 'Nuff said.

WALTER YOUNG
Hendersonville, Tenn.

CONFUSED AND FRUSTRATED

I'm confused. I'm frustrated. And maybe I'm just a little angry.

Consider the events of the past week: to begin, I purchased the February '71 issue of CW seven days ago. That was the one containing the preview of the Suzuki water-cooled 750 Three. The bike had little effect on me at first. But as the days passed I found myself thinking of it more and more. I read Yukio Kuroda's description over and over. I became a part of each color photo. It was settled, I would have one of those Suzuki Threes! Or would I? (Here's where things begin to get warm.)

Today I went to the local Suzuki dealer to ask when the first shipment of 750s would arrive. The dealer answered by saying that the factory hadn't made a final decision as to the production of the big bike and that if it did put the model into production it would do so in the summer and the first deliveries wouldn't arrive until winter.

Confusion—"CYCLE WORLD says spring. *Cycle Guide* says spring. The dealer is saying winter. Who do I believe?" The dealer went on to say that the model that was displayed at the Tokyo Motor Show was strictly a show model—for now. He had received a letter from the factory indicating just that.

Frustration—"Why did they wave that big, beautiful machine under my nose, then yank it away?" But the dealer wasn't through yet. He said that I shouldn't believe anything I read in magazines. Not road tests, not previews of new models—not anything.

Confusion + Frustration = Anger

I've never made a habit of believing all that I read. But since that is the best method available for learning, save experience itself, I would like to say that I

(Continued on page 26)

BSA FIREBIRD SCRAMBLER 650-SS.

ENGINE TYPE: OHV 4-stroke
CYLINDERS: 2
MAX. HP: 54 bhp @ 7250 rpm
MAX. TORQUE: 39.4 ft. lb. @ 6500 rpm
BORE/STROKE: 75 x 74 mm
COMP. RATIO: 9:1
TRANSMISSION: 4-Speed gearbox
CARBURETOR: 2-Amal 30 mm concentric
FRONT TIRE: Dunlop 3.50 x 19" K70
REAR TIRE: Dunlop 4.00 x 18" K70
FRONT BRAKE: 8" DLS
REAR BRAKE: 7" SLS
WHEEL BASE: 56"
GROUND CLEAR.: 7½"
DRY WEIGHT: 395 lbs.
FUEL TANK: 3 gals.
OIL: 6 pts.

THE POWER AND THE GLORY OF THE 650s.

The BSA 650s all have a bike-full of new features that were developed and proven in actual races in the U.S. (BSA won more AMA championship races in 1970 than any other bike). Some of the race-tested features on all three 650s include: New lightweight forks with 6¾ inch travel. New spine that holds and cools the oil and saves the weight of an oil tank. New double leading shoe brakes with independent external adjustments. But look at all three before you decide if you want to ride the Lightning, the Thunderbolt or the Firebird Scrambler.

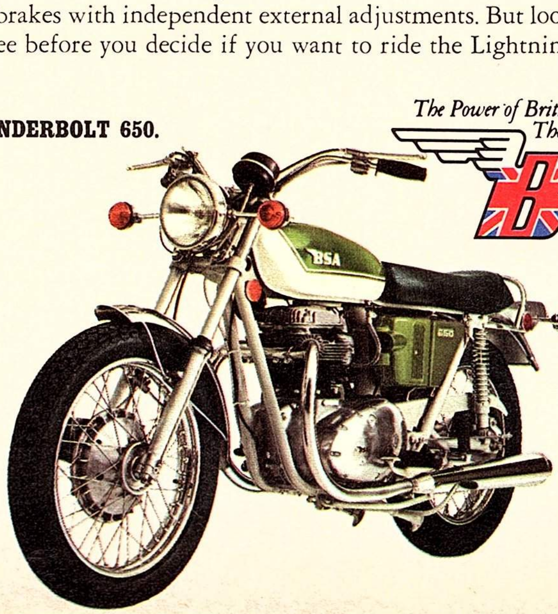
BSA THUNDERBOLT 650. The specs are mainly the same as the Firebird except as follows: MAX. HP: 46 bhp @ 7000 rpm. MAX. TORQUE: 36.5 ft. lb. @ 5750 rpm. CARB: single Amal 28 mm concentric. DRY WEIGHT: 390 lbs.

BSA LIGHTNING 650. The specs are mainly the same as the Firebird except as follows: MAX. HP: 52 bhp @ 7000 rpm. DRY WEIGHT: 393 lbs.

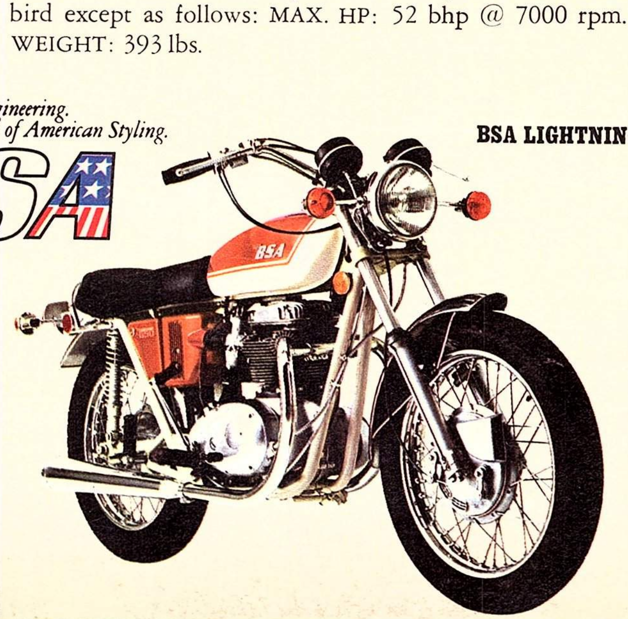
The Power of British Engineering.
The Glory of American Styling.

BSA

BSA THUNDERBOLT 650.



BSA LIGHTNING 650.



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C3140 . . . 1-1/2" Exhaust . . . .
C3141 . . . 1-3/4" Exhaust . . . .

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7/8" or 1" x 4" 12.95

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Same for "Sportster".

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Long fork tubes. These tubes are made of the highest quality high-chrome steel available in lengths up to fifteen inches over stock length. Prices are as follows:
Harley-Davidson FL and Hydra-Glide models $60.00
Sportster models – Same.
Triumph, all models. (Please specify make and year when ordering). Same as above.
B.S.A., all models $70.00

For chrome-plated tubes, add $10.00 to total price.

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2" or 3" Narrower $59.95
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Harley, Triumph, BSA. Specify Year

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LETTERS

Continued from page 24

believe more what I read than the ridiculous statements of motorcycle dealers who, by the way, have a showroom that is overflowing with models of another make.

And so, may I ask, knowing that the answers will have been given prior to the printing of my letter: what is the story of the Suzuki water-cooled 750 Three? Will it be spring or winter? And if, as I suspect, CW's information is correct, what of the factory/dealer relationships as the one in question? And finally, if the Suzuki factory is innocent, what of motorcycle dealers who fail to tell it straight to prospective motorcyclists?

DOUGLAS KHTIKIAN
White Plains, N.Y.

Pardon us if we misled you. The availability in question referred to Japan, although that too seems in doubt according to the latest news from Japan. As for U.S. availability, the latest estimates set it for the 1972 model year. —Ed.

ON TRIALS

I have just finished reading with great interest the articles "Always on Sunday" and "International Six Days Trials," in the January '71 issue of CYCLE WORLD. I've never been to a trials so I don't know an awful lot about them and I'd like to ask you some questions, if you don't mind, about this sport. In the article, "Always on Sunday," it said there was a loss of 1 point for a dab, 5 for a loss of forward motion, and 10 for out of bounds, and I'm wondering if that is really the way it's done. How many points are you given to begin with? Is the whole course observed? Usually how many sections are there, and how many times do they have to be traveled? Are these trials events all generally run in the same manner, or do they vary greatly from one part of the country to the other? I would greatly appreciate all of the information you can give me about this sport.

JOE MORRIS
Milwaukie, Ore.

The trials scoring system is like scoring in golf. The more you got, the worse you did. Usually, a single dab counts 1 point; two or more dabs within a section count 3 points (you could dab 10 times in a section and still only get 3 points); stopping the bike with feet down, rider being unable to resume forward motion immediately, costs 5 points; running outside the boundaries of a section costs 10 points.

A trials consists of several sections,

(Continued on page 30)

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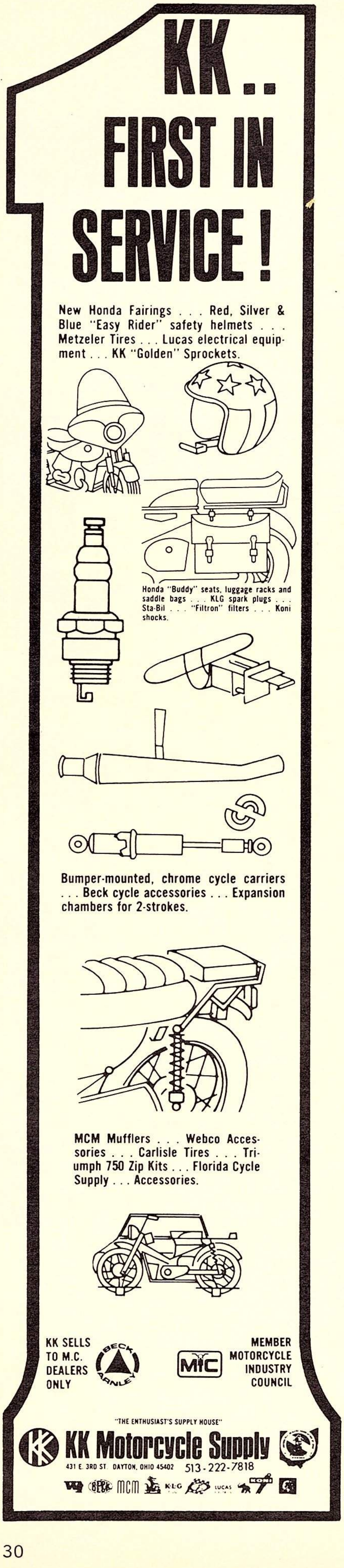
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LETTERS

Continued from page 26

interspersed with "free" areas. The sections differ in length and may follow natural terrain or be marked off with tape. They may only be 50 ft. long or, as in the Scottish, the better part of a mile. Observation and scoring for dabs takes place within the sections only, not in between. Trials vary greatly from one area to another, partly due to variations in terrain, and due to the skill of the organizing club in laying out sections. Where lots of terrain is available, sections do not repeat. With limited area, a sequence of 10 or 20 sections may be repeated. For more detail, we suggest Sammy Miller's book, "On Trials."—Ed.

LOST BY DEFAULT

After three years of saving to buy a trail bike, my dreams have been shattered by a recent ban on motorcycles by county and state officials. Here in Maryland a decision has been made, outlawing all motorcycles in Gunpowder State Park. The thing that hurts most is that no one, including myself, protested or fought back before the decision was made to outlaw bikes in the Park.

This was the only place available for us to ride our bikes legally and now we have nowhere to ride. Many of my friends own trail bikes, many recently purchased, and now they have no place to ride them. To me, owning a motorcycle and having no place to ride is the worst possible thing in the world.

About the worst problem we face is the few irresponsible and dangerous riders who ruin it for all the other riders. It is those who have wrecked the chains and barriers, ridden without mufflers and scared hikers and horseback riders who were actually barred from the Park. We just suffer along with them.

I have talked with congressmen, the State Parks Commission and countless other people, and they are all willing to help, but they also must think of what the careless riders do. Everyone can help our situation by being thoughtful of the land and people they come in contact with. Anyone interested in helping the campaign in Baltimore County to reopen the State Parks may contact me at my address. They should also write their congressmen. Please print this letter so that others may learn from our mistakes.

KEITH QUELET
4013 Klausmier Rd.
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BY
JODY
NICHOLAS

LEAVE THE TESTING TO US

In connection with your specification figures on various machines, I have a question to ask. I have sometimes checked them and found a considerable disagreement as to your computed top speeds at a given rpm. For instance, in your February 1971 issue for the Yamaha RT-1B on page 41, computed top speed in gears at 6500 rpm is: 5th, 73; 4th, 57; 3rd, 44; 2nd, 32; and 1st, 22. I get for these, 5th, 79.5; 4th, 61.1; 3rd, 46.8; 2nd, 34.1; and 1st, 24.2. In addition, you quote an actual top speed at 7400 rpm of 83.72 in 5th, but 92.7 would be produced, as I figure it. With a locked up drive there is no slippage, and the computed figures should be the same as the actual, if the tach and speedometer or other device is accurate.

This is a matter of simple mathematics, and the only place I can see where a difference might occur and my figures be in error would be in the actual diameter of the wheel, including tire, but that should make only a slight difference and not account for as much as occurred here. As to wheel diameter, I used your 18-in. wheel and 4-in. tire which give, if the tire is round, 18 plus 8, or 26 in., times 3 and 1/7th, which produces a distance per revolution of 6.8 ft. I would appreciate very much your explaining this to me.

I would also like to know why some of the engine graphs show a road speed increasing with an rpm higher than that at which maximum horsepower is developed. Horsepower is the rate of doing work and a moving machine is, of course, doing more work at a greater road speed. This is a contradiction in terms unless something else is meant, which I don't understand. I suppose if horsepower were read directly off the engine drive shaft it might turn faster without putting out any more horsepower, but the method of testing horsepower is to put a brake dynamometer on the shaft, which puts a load on it so, therefore, calls for the production of more work with more rpm, and more work means more horsepower.

Terrell Marshall
Little Rock, Ark.

From the aspect of *practicality*, CYCLE WORLD road tests are the most complete and valid in the world. Obviously, it is not possible to test each and every machine under conditions of an *exact* nature, "exact" here meaning conditions of the same ambient temperature, relative humidity, barometric pressure and wind speed, to say nothing of the altitude of the test location. It is also not possible to test the various machines using the same rider in each case. Even the same rider may ride a certain machine on two consecutive days and get different test results. The reasons for this should be obvious.

What we do, however, is report the conditions under which we test each machine, including the temperature, relative humidity, test weight, etc., and present these figures to the reader in graphic form. That's more than you can say for any other motorcycle magazine published in America! It's the most objective way we know, and I think most readers will agree with what I've said.

But getting back to your letter. Your first mistake was in measuring the tire. Just because a tire is designated 4.00-18 (on the rear) doesn't necessarily mean that the tire is 4 in. "high." The "4.00" means that the effective tread area is 4 in. *wide*. The tire on a Yamaha RT-1B

(Continued on page 34)

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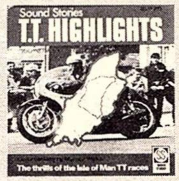

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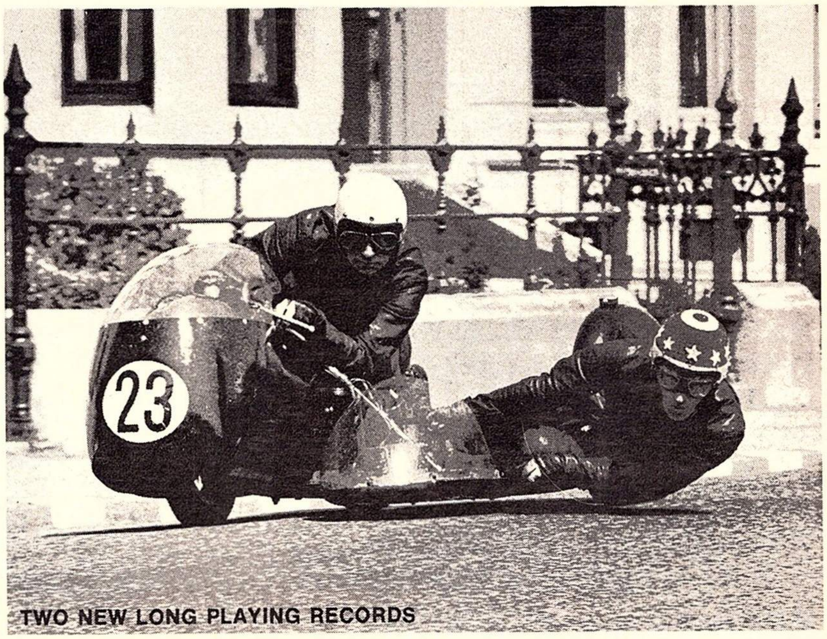

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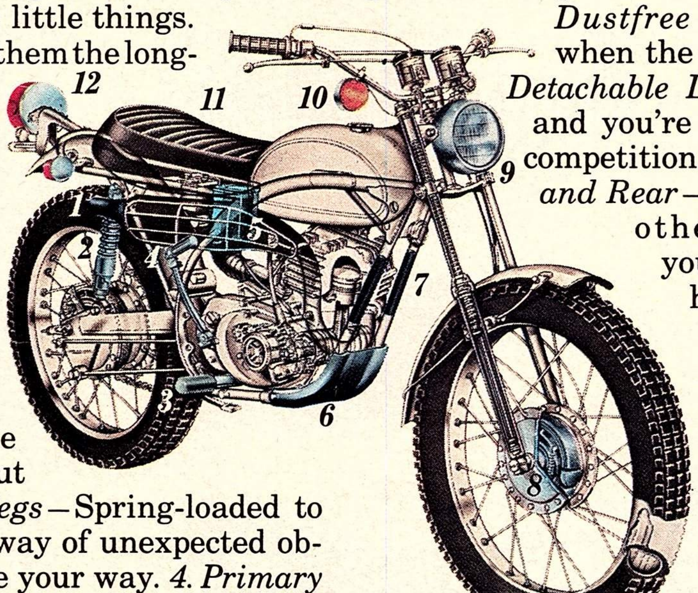

Now, we'd like to give them the long-overdue credit they deserve. By the numbers: *1. Federal Forestry Approved Spark Arrester*—added protection for you and other living things, wherever you ride. *2. 3-Step Adjustable Rear Shocks*—let you regulate the dampening action to match the lay of the land you're out to tackle. *3. Fold-up Pegs*—Spring-loaded to pop up and out of the way of unexpected obstacles that might come your way. *4. Primary Kick Starting*—lets you start (or restart as the case may be) in any gear, without first having to search for neutral. *5. Foam Air Cleaner*—traps smaller particles than paper filters. You can clean it out and reuse it. Just try that with the paper kind! *6. Full-Cover Skidplate*—keeps mud, rocks and other debris from reaching the engine. Steel-clad protection. *7. Double Loop Cradle Frame*—advanced design for greater strength and longer life. *8. Waterproof/Dustfree Brakes*—won't fade when the pressure's really on. *9. Detachable Lights*—take them off, and you're all set for the heat of competition. *10. Turn Signals Front and Rear*—added safety. Lets the other guy know where you're headed before you head there. *11. Tilt-Up Seat*—for easy access to battery and tool kit. *12. Bigger, Brighter Stoplight*—daytime or night, it keeps the traffic off your back.

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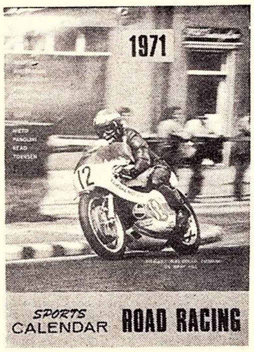

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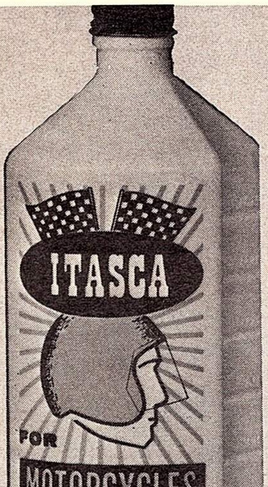

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SERVICE

Continued from page 32

we have in the shop, which has 500 miles on the speedometer, has a measured distance from the outer edge of the rim to the edge of the tire of 3 3/4 in. If you measured the tire from the bottom of the bead, the reading would be something like 4 1/4 in.

You've queried "why some of the engine graphs show a road speed increasing with an rpm higher than that at which maximum horsepower is developed." That's quite simple to answer, really. Some engines are capable of turning more rpm than that at which maximum power is developed, and many will continue revving (if no load is imposed) until they destroy themselves. Many manufacturers specify a maximum safe rpm for a particular engine, but it is difficult to know just when that rpm figure is reached if no tachometer is fitted. I'll wager that not many people could tell just by feeling the vibration in the handlebars, footpegs or the seat of his pants!

The Yamaha RT-1B we tested did, in fact, have a tachometer, but because of the final gear ratio, it would easily exceed not only the maximum horsepower rpm of 6000, and the red-line speed of 6500 (at which engine speed the computed speed in gears is calculated), but would go all the way to 7400 rpm. We wouldn't recommend that the average owner run his RT-1B that high, but we're in a little different situation. Some machines we've tested were so overgeared that they wouldn't even reach the maximum power rpm, much less the maximum safe engine rpm. Had Yamaha decided to gear the RT-1B with a total reduction ratio of, say, 4.0:1 in top gear, I don't think it would have been capable of reaching 6500 rpm anywhere, short of going down a 25 percent grade! (That's 112.5 mph!) In fact, most road machines are geared a little on the high side on purpose to protect the engine from being overrevved in top gear. ▣

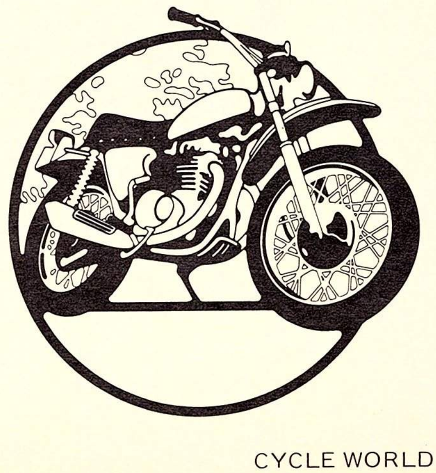
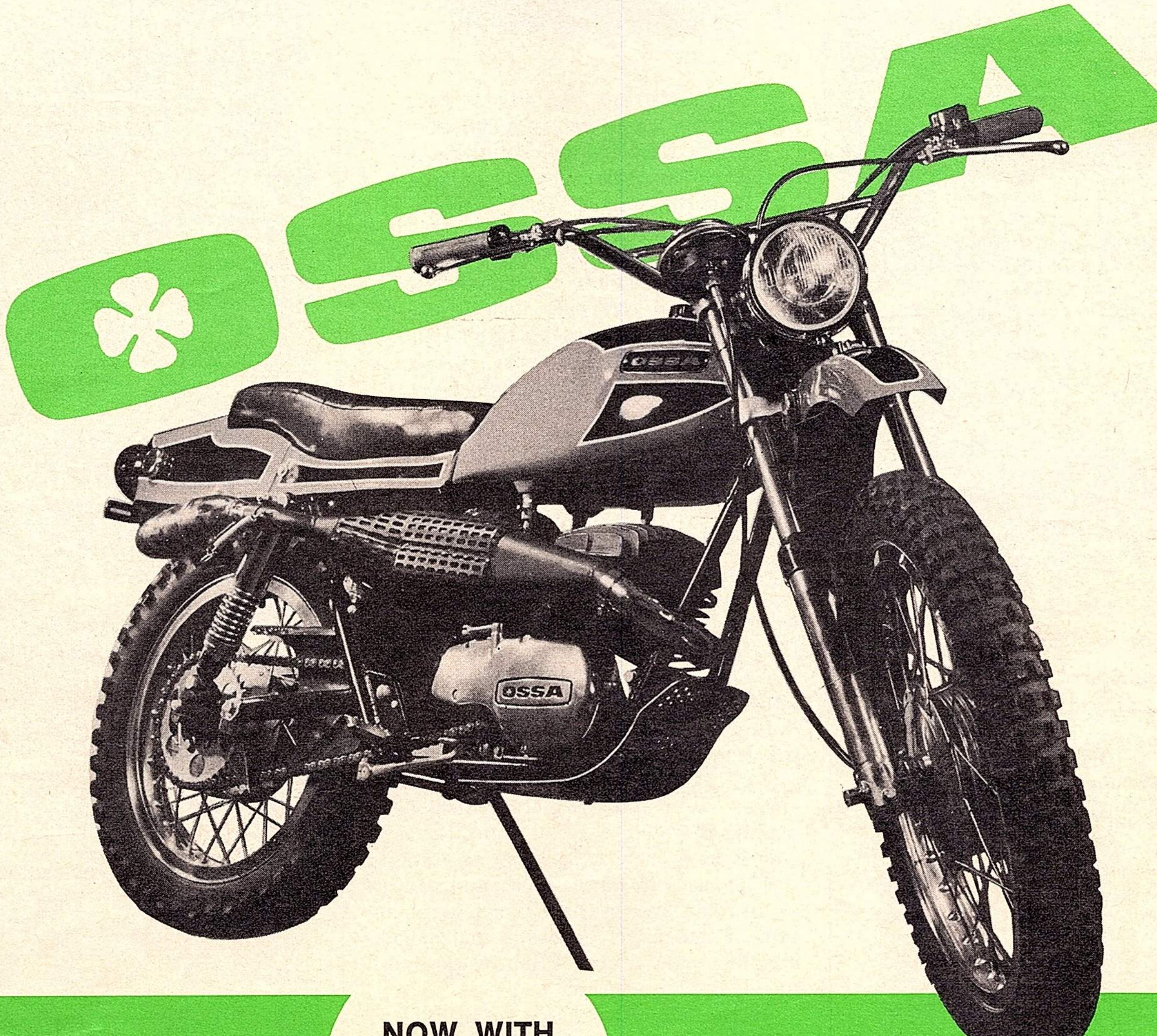


Illustration By Richard Parker

The Pioneer for 1971



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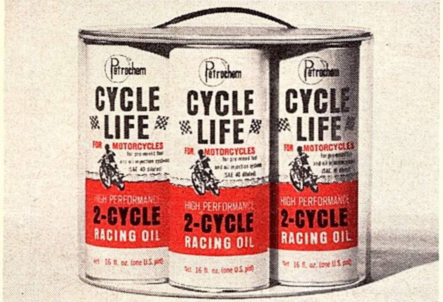

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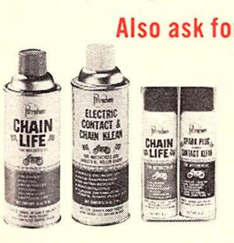

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FEEDBACK

Readers are invited to have their say about motorcycles they own or have owned. Anything is fair game: performance, handling, reliability, service, parts availability, funkiness, lovability, you name it. Suggestions: be objective, be fair, no wildly emotional but ill-founded invectives; include useful facts like miles on odometer, time owned, model year, special equipment and accessories bought, etc.

COMMANDO VS. HONDA

May I add my two cents to what Richard Kennedy and Robert Bausch have said about the Norton Commando (February issue)? I own a Commando and have put quite a few miles on a Honda Four, and would have to admit that in any objective analysis the Honda is the superior machine. But, as Bausch's letter demonstrates, the Norton can hold a tremendous emotional appeal for some people. Me, for instance. I own one of the long-stroke, oil-leaking beasts and love it in spite of all its British-engineering-at-its-worst vices. True, the engine is as archaic as a stone ax, but it still manages to put out as much power as you can ever use, and that combination of flat power band and unexcelled handling make it one of the easiest bikes to ride hard ever made.

In the end either liking or disliking a machine like the Commando is simply a matter of personal preference. You either like it for what it does well and ignore the faults or else you hate it and look for something that suits you better. What could be more human?

Robert M. White
Houston, Texas

HAPPY GUZZI OWNER

I periodically grab a back issue of a cycle magazine off my shelf at random. Today I happened to pick the January 1968 issue of CW and read your test on the Moto Guzzi V-7. I happen to be a lucky and very happy owner of a 750-cc Guzzi.

In your article, it says:

"The V-7 arrives from the factory with a pair of bars forward which are designed to protect both the protruding cylinder barrels and the rider's legs in the event the machine tips over. Whether these bars would withstand a crash of any great severity is a matter

(Continued on page 38)

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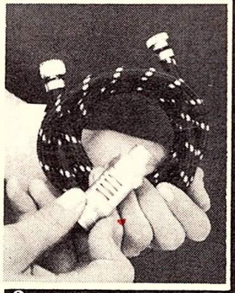

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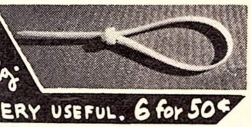

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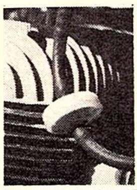

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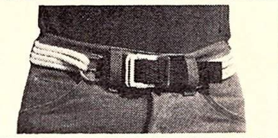

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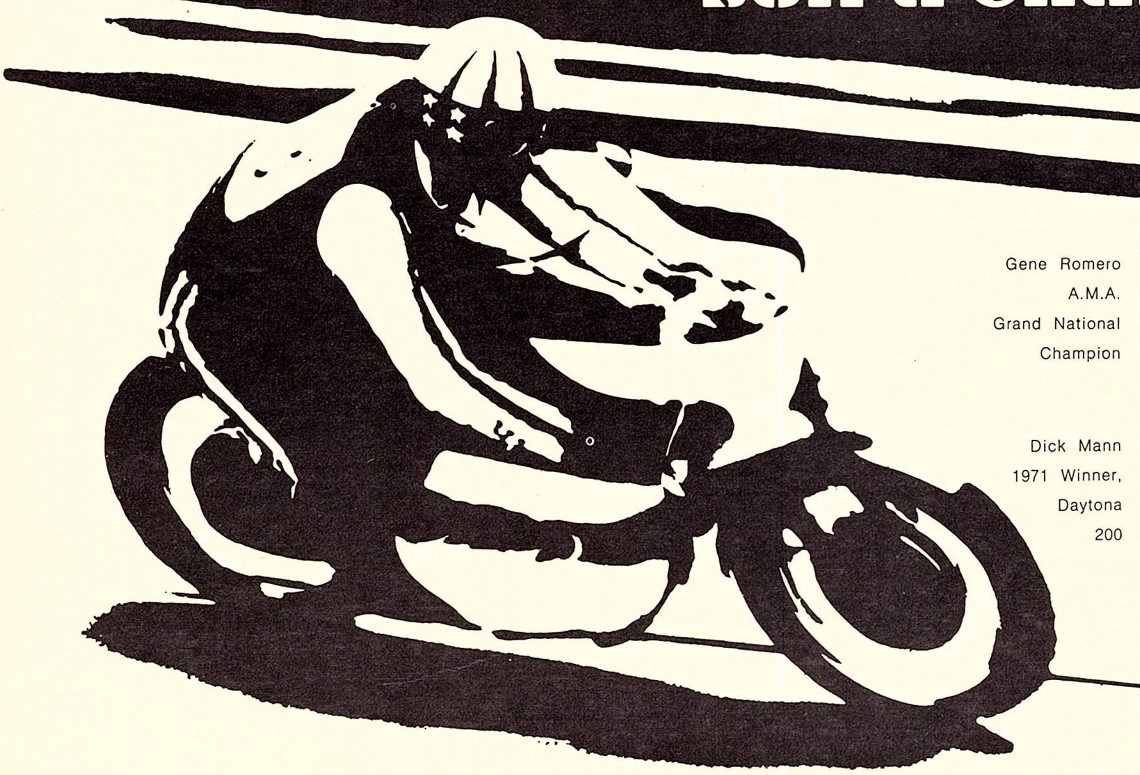

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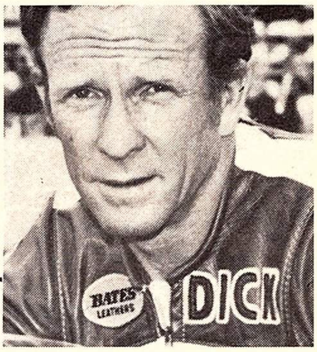

Dick Mann
1971 Winner,
Daytona
200

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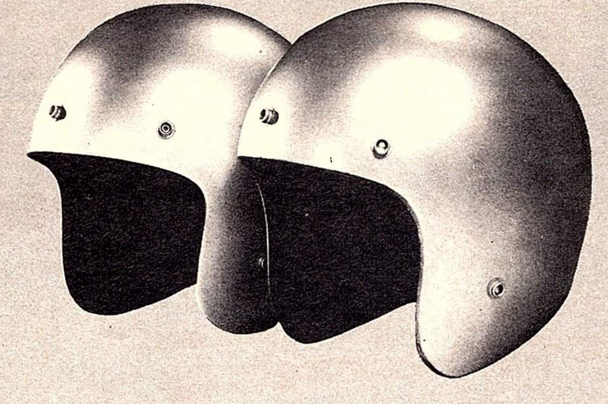

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We hold this truth not to be self-evident. Take the two shells above. They look the same, but in fact, are very different. The one on the left is made of a new material called polycarbonate (better known as plastic). This type of shell is almost indestructible and would seem to have a big advantage. But actually, a plastic helmet has a severe disadvantage. Plastic will not absorb shock on impact. Any blow is passed on virtually undiminished, all the energy from impact must then be absorbed by the helmet liner — and your head!

Now look at the shell on the right. It's constructed of tough and durable fibreglass. Fibreglass has an inherent quality to absorb energy under impact. The shell is partially destroyed by a severe blow. In other words, it can yield on impact, thereby absorbing much of the initial shock of any blow. The liner has only to absorb the secondary and diminished shock from impact. And your head then, is doubly protected.

Try this little experiment. Take a fibreglass helmet and a plastic helmet and drop them simultaneously to the floor. Watch how the plastic helmet rebounds like a ping pong ball (think how your head would feel inside a plastic helmet). Notice how the fibreglass helmet deadens on impact — this is energy absorbtion.

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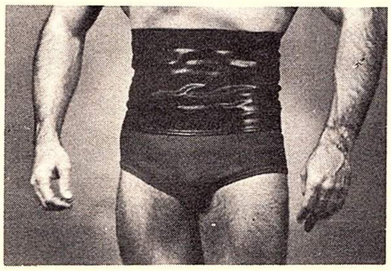

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"FEEDBACK"

Continued from page 36

for speculation, but not test."

I happily am able to report, "They do."

Incidentally, I also own a 500-cc BMW, and anyone who says that the vibration of the Moto Guzzi V-Twin is anything more than negligibly greater than that of the BMW opposed Twin is out of his tree, or should live in an incubator: they're *both* all-day machines.

Dan Jopp
St. Paul, Minn.

LETTER TO MANUFACTURERS:

When, if ever, are you going to provide built-in wheel locking devices for both the front and the back wheel for all those expensive and oh-so-stealable street machines? Steering head locks are a joke. All a pair of thieves has to do is lift the front end and wheel the bike up a ramp onto their waiting pickup truck. But with both wheels immobilized it would take a good sized crew of Robin's merry men to lift a Sportster into a truck. Sure, they can use a tow-truck, but at that stage of sophistication we have to assume the truck is equipped with a cutting torch, so there's no advantage to running a case hardened chain to a fireplug. Locking both wheels effectively prevents rollaway thefts whether the bike is attached to anything or not.

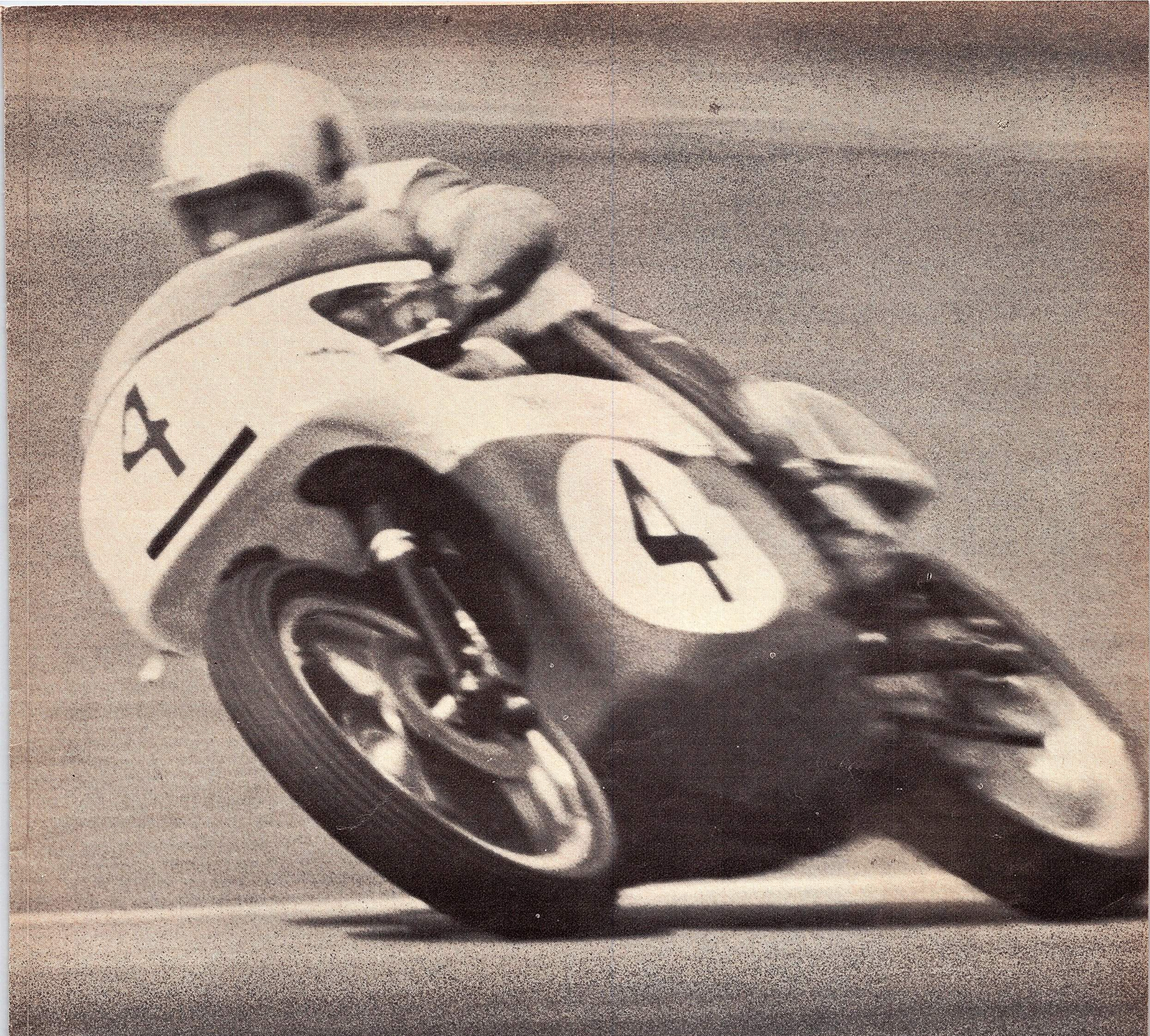
It's disgusting to look at the left swinging arm on my Sportster. (Don't print my address. The bomb shelter I keep it in only has a two-foot-thick door.) The left part of the rear wheel hub has a series of large holes in it. All the factory would have to do is to modify the axle mounting casting, at negligible cost, to provide a sturdy hasp-like fitting, and a padlock could be run from the swinging arm to the wheel hub, taking care of that end of the bike.

As for the front wheel, it's easy to visualize a cylinder lock cast into or welded to the fork tube so that a plunger could be locked into a hole, parallel to the axle, cast into the front hub. Presto. There's no way to move the bike except to carry it. Happy hernia to bike thieves.

Note that immobilizing the wheels works best for the big bikes that are most likely to be stolen, and are the worst financial loss when they are stolen.

Most "new" features in motorcycles turn out to have been originally produced in 1928 or 1904, but I've never heard of a motorcycle incorporating this obvious anti-theft feature. Apparently the manufacturers feel that every bike

(Continued on page 40)



Staying on top.

The world's finest motorcycle racers were among the 89 starters at this year's AMA Daytona "200." And one of the most respected was BSA rider Dick Mann.

Fighting to the lead on the 41st lap of the 53-lap classic, Dick stayed in front for his second consecutive Daytona "200" victory—at a record-setting 104.7 mph average.

Dick's spark plugs? The same brand chosen by BSA engineers.

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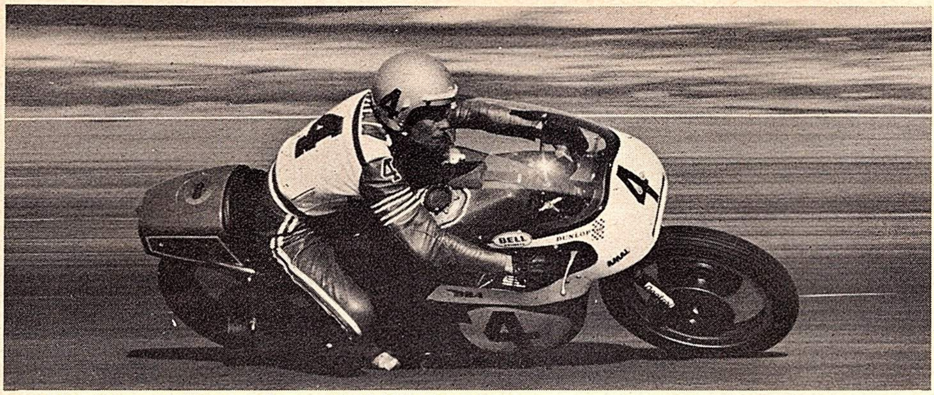
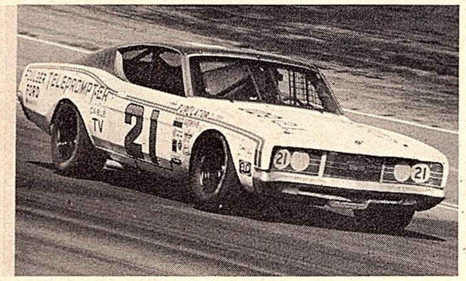
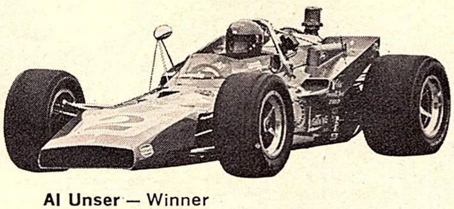


Dick Mann — Winner — Daytona 200 Mile Road Race



A.J. Foyt — Winner
Ontario/Miller High Life 500



Al Unser — Winner
Rafaela, Argentina

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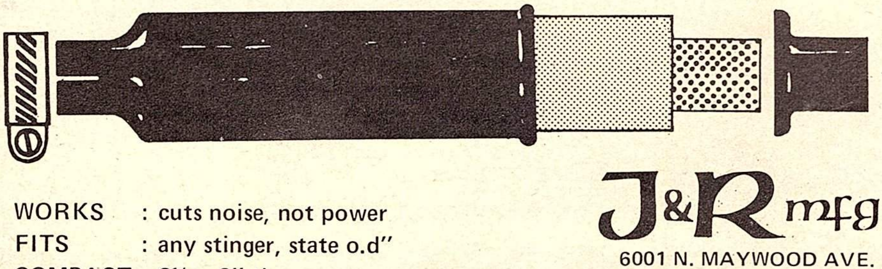

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"FEEDBACK"

Continued from page 38

stolen means another potential replacement sale for themselves, so why should they worry. Perhaps the DOT, busily formalizing standards to put neutral at the bottom of the shift pattern, could require wheel locks on all bikes over, say, 400 lb. These locks would do infinitely more good than those silly side reflectors.

The only drawback to letting the Feds do it is that, sure as death and taxes, they would also require electrical interlocks between the wheel locking mechanism and the ignition switch, the gear selector, the passenger handle and the eight-track stereo tape player. This would be bureaucratic overkill of the usual kind since: a) there are already plenty of people who regularly manage to muster the degree of smarts necessary to remove a locking chain from their bike's wheels before attempting to smoke off, and b) if a locking mechanism strong enough to resist the tender attention of your friendly local bike-snatcher is built into the wheel hubs, it'll be strong enough so that nothing worse than a stalled engine and a red face occurs, assuming you forget to disconnect it.

It took a federal law to force the automobile manufacturers to do anything at all to raise the anti-theft rating of their cars. Perhaps that's the only thing which will move you motorcycle manufacturers. I'm afraid that you manufacturers of Bonnevilles, Sportsters and Fours, the bikes most popular on the um, aftermarket, will join Norton and BMW and Moto-Guzzi and the rest in a game of musical hands—to see who can sit on theirs the longest—while good old Janacek & Wanderer quickly revise their products to include wheel locks.

J.G. Krol
Anaheim, Calif.

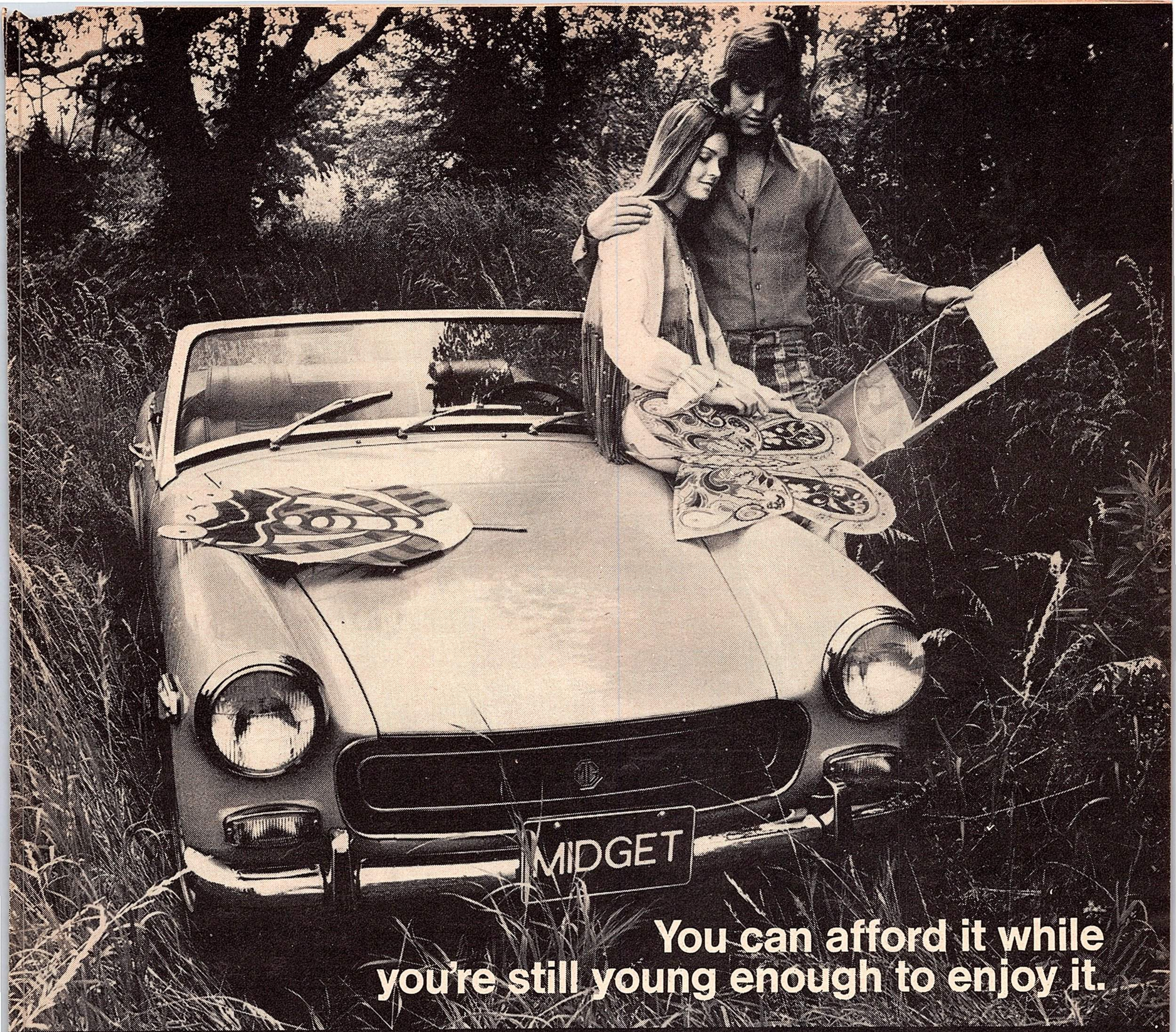
1969 SUZUKI TITAN

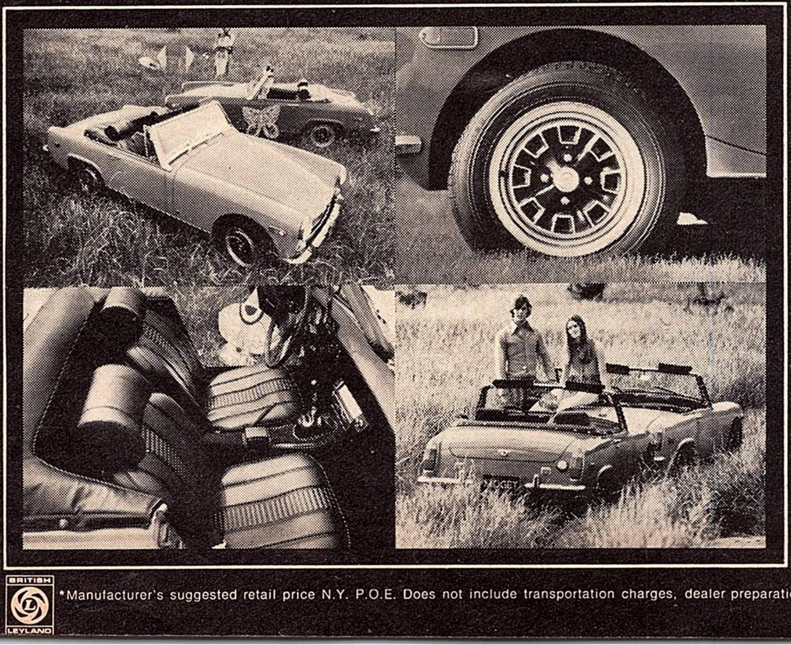
This letter is long past due. I should have written this unsolicited testimonial many, many miles ago. My 1969 Suzuki 500 Titan has been a "Super" bike in most every way.

To me the most important requisites for any vehicle are: 1) dependability, 2) performance, 3) good looks, and 4) cost (initial and upkeep). In my opinion, the Titan rates near tops in all of these categories.

I have just turned 35,000 miles and have had excellent success. At 16,000 miles my left condenser became intermittent (running fine for a few hundred miles and then being dead for about 10 miles). At this same time a new chain was installed (I had to buy rubber boots

(Continued on page 42)





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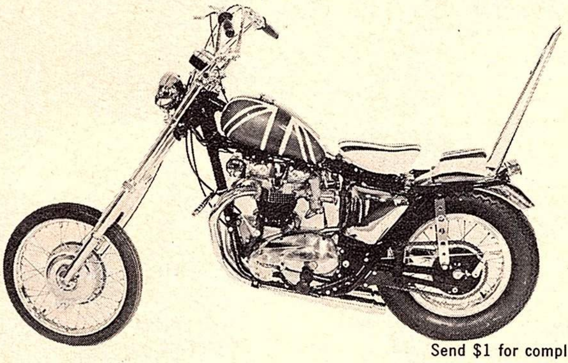

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"FEEDBACK"

Continued from page 40

to keep my feet dry from all my Honda 750 pals' tears).

At 32,000 miles I installed another chain, a set of points and a tachometer cable. Outside of a handful of headlamp bulbs (I do all of my road riding with my lights on) and tires, that is all I have spent on the bike. One cannot ride a bicycle much cheaper.

I clean the plugs at 3000-mile intervals and change them every 5000 miles. I have only fouled one plug since purchase and that on my way back from an extended high- and low-speed trip to Canada, and in very, very hot weather. My Suzuki was the first bike to arrive in Mazatlan on the original Mexican tour, and performed beautifully, seemingly running equally well on either high grade kerosene in Mexico or on the unleaded gas I normally use. I dismantle and decarbon every 10,000 miles, checking the battery, point gap and muffler baffles. I lube my chain with a homemade concoction of Vasoline thinned with acetone (the vehicle evaporating leaving only the grease). I take excellent care of my machine but ride it very hard. In all of the 35,000 miles it has never left me stranded or forced me to return home.

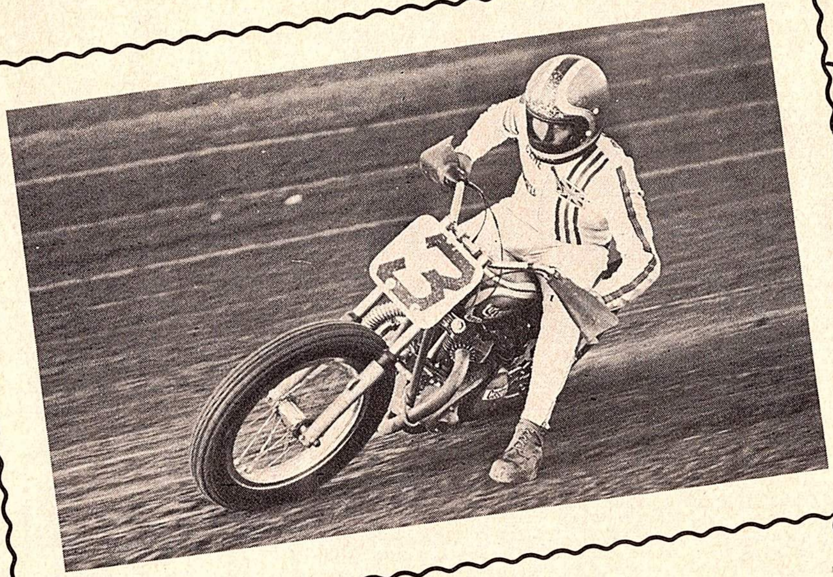
Even though it's a two-cycle, my oil consumption is about the same as any other road bike: about five quarts every 3000 miles, including changing the transmission oil. Except for "honking" it on after first starting it up, it smokes most imperceptibly. My gasoline consumption is consistently less than other machines at lower speeds, but does start to exceed the others when speeds of over 75 mph are reached. I have gotten as high as 55.5 mpg on a two-way, 800-mile trip (before windshield and bags), and as low as 30 mpg on Mexican gas, with shield, bags, high wind and high speeds.

The motorcycle is perfectly stock except for windshield, bags, home-made throttle lock, oversized front tire and a primary sprocket with one less tooth.

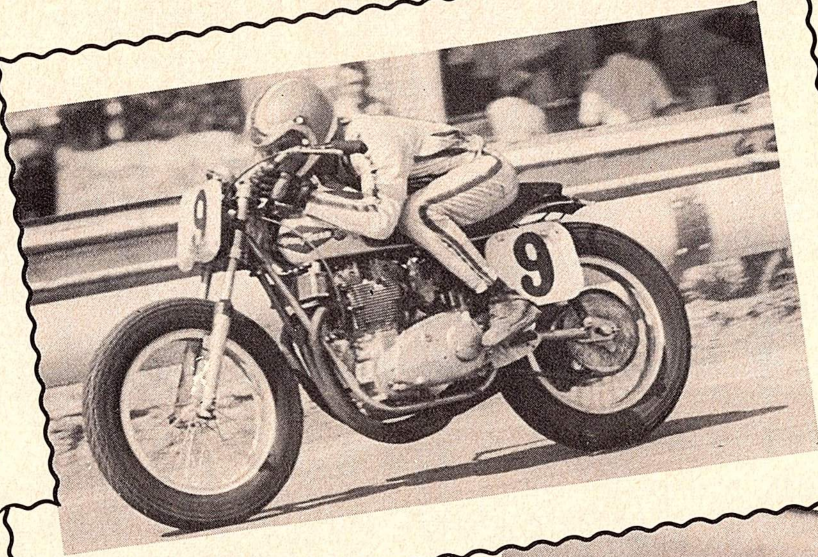
The things I do not like about the bike are an engine vibration that started between 3500 rpm and 4000 rpm when new and has widened to between 3000 and 4500 rpm with age (probably crankshaft flex), a disconcerting rattle from the clutch or throwout bearing when idling in neutral, and no electric starter.

The 500 is my first experience with Suzuki (I have since bought a 350 for my wife), although I have had a number of machines including two Cushmans, one Whizzer, one Powell, one Salisbury, one Honda, one Benelli, one AJS, one BSA, and five Yamahas (I still own two AT-1s).

(Continued on page 44)



GENE ROMERO



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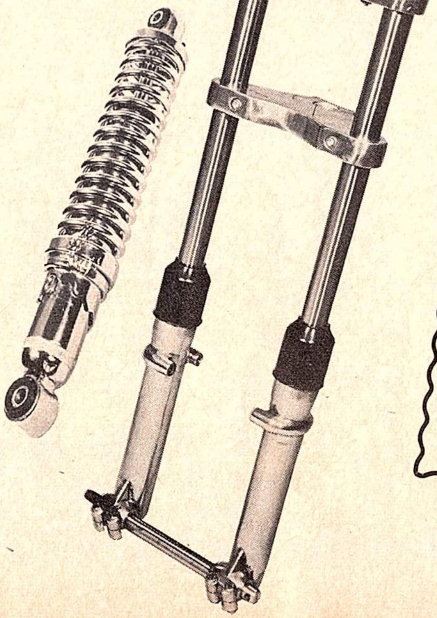

Machines, techniques, engines may differ greatly but these three top riders agree on one thing — Betor Forks and Shock Absorbers make a good bike handle better. Add them to your machine and you'll know what they mean. Contact your local dealer or distributor.

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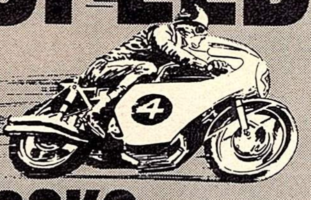

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"FEEDBACK"

Continued from page 42

In summation, I will say that I feel the Titan to be one of the most beautiful bikes around, one of the most dependable (I think the most dependable, BMW notwithstanding), one of the best performing (I have ridden with and against most everything and have never been embarrassed, due to the ease with which the Titan can be kept in tip-top tune). All things considered, it is one of the best bikes in the world and certainly *the* best buy. A potent machine like this with two mirrors, a luggage rack, sportster bags and windshield for under $1000. How can you beat it? You can't! Thanks for the tremendous product.

Gene Wilson Jr.
Los Angeles, Calif.

P.S. A couple of more likes and dislikes.

Likes—The toolkit in the side case. Every time we go on a trip it's "good ole Wilson" everyone comes to for minor adjustments, because I can readily get to my tools. Toolkits under the seat require near complete unloading to reach, and what with chain adjustments needed on the 750 Honda every few hundred miles, this is no small time loss.

Likes—The small headlight bulb used on the Titan instead of the large sealed beam. Seldom has a trip passed when a Honda or 650 Yamaha rider has not lost a headlamp element and has had to do without as the lamps are too large to carry.

Likes—Oil-tightness. I would not be afraid to park my bike on a fine carpet, as it never loses a drop (woe unto my English bike rider friends).

Dislikes, or wish fors—My front fender brace broke and my dealer informed me that fenders were not covered under warranty and that separate braces are not made. I made one from scrap and had it chromed for $3. I think the braces should be made available separately.

Dislike—A "pinging" sometimes occurs which necessitates decarboning the heads. It does not seem to affect the performance, but is somewhat annoying.

Dislike—The greatest annoyance of all. The tools are made of a material that blackens one's hands (and clothes) with carbon.

Please consider adding the following to any road bike you make in the future (if the following were added to the Titan it would be the near-perfect machine): 1) Drive shaft, 2) electric starter, 3) effective horn, 4) larger gas tank, 5) gas gauge (whatever happened to the neoprene tubing on the 250), 6) throttle lock, 7) tools made from a better material. ◘

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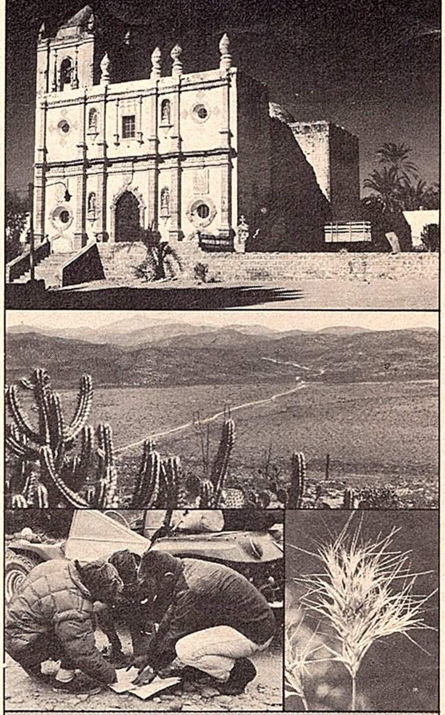
handbook



BAJA HANDBOOK For The Motorist in Lower California by James T. Crow $2.50 The author does not claim it to be a guidebook, history book or social study, yet it is all of these and more. It gives tips on the people, the language, documents, money, what to take with you (and what to leave home), preparation, when to go, how long to stay, how much to spend, camping, wild life, vehicle types and even a list of other publications about Baja California. Its everything the first-time visitor to Baja needs to know, and some things the "veteran" should have known. **Paper cover / 96 pages / 6 by 9 inches / maps / 43 photos**

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THE SCENE

BY IVAN J. WAGAR

IN THE February issue of CYCLE WORLD this column took to task the American Motorcycle Association Competition Congress for not taking a harder position on the restriction of noise in all Sportsman (now Amateur) competition. In the May issue I went after the dealers about using more discretion when selling machines with full expansion chambers, or converting to loud exhaust systems for non-racing purposes.

Lest you get the idea that I've completely flipped my lid, let me remind you that I have sat over a racing megaphone for several thousand road racing miles, loving every minute of it, but losing some of my hearing every time I went out.

My plea for less noise is not merely based on my own hearing problems. I have had to argue for motorcycling before legislators and I have been able to convince most of them that motorcycles and motorcycling are good. I cannot, however, present further argument when "They" admit that separate driver licensing and better operator training will help our cause, but they add that they feel the motorcycle is doomed, because it makes too much noise.

Only a few percent of all motorcycles on the road are excessively loud. But the loud bikes receive the attention. Most riders, dealers, and some manufacturers feel there should be no noise restriction on off-road machines, and that is pure crap, man. Motorcycling will continue to suffer strangulation as long as we have racing machines used for non-racing purposes.

The following is a message I sent to the Motorcycle Industry Council annual meeting in Washington, D.C.

> One year ago, at our first annual meeting, our guest speaker, Douglas Toms (NHTSA Administrator), suggested three areas in which MIC should "do their homework" and preempt the legislators: tire standards, cleaning up and setting our own standards for exhaust emissions, and *NOISE*.
>
> I am appalled to see 1971 catalogs from MIC member firms displaying machines fitted with racing exhaust systems for general consumption. Not only are race kitted versions of popular models available to the public at large, but even new motocross racing motorcycles are offered, as play bikes, to anyone. As long as you continue this practice our industry is living in a glass house, and is fair game for any hotshot legislator with a big rock in his hand.
>
> Three years ago, when I visited Spain for the first time, the owner of one of the factories asked me to explain the fantastic growth of motocross over the previous five years. When I told him motocross in the U.S. was in its infancy, he could not understand it. He then told me that his U.S. importer had been ordering 80 percent of his total allotment in motocross machines. The factory owner, when told that these motorcycles were being used for enduros, play racing, and general riding, commented: "But the engine characteristics are completely wrong for general riding. How can the riders stand the noise? And surely there are complaints from non-motorcycle people; such a thing would not be permitted in Europe."
>
> I mention this example only because it completely sums up the motorcycle noise problem in this country. As long as *YOU* continue to import, advertise and glamorize the advantages of racing machines for the general public, people will buy them and the legislators will close lands.
>
> Once the lands are closed we have no alternative but to spend large amounts of money and devote endless hours of effort negotiating back small parcels in the form of motorcycle parks. It is somewhat like the North American Indians being robbed of their freedom and sent off to the reservations. I don't think that motorcycling can expect any more public sympathy today than the Indians received under the political guise of bettering our society.
>
> In my column in CYCLE WORLD I have tried to educate motorcyclists on the noise issue; it hasn't worked. People do not buy magazines to be lectured. I have criticized the AMA Competition Congress for not adopting strong noise rules for sporting events. In the May issue of CYCLE WORLD you will read a plea to the dealers to face up to their responsibility to fight noise and join the MIC. But can we really expect the dealer, the AMA, or the consumer to help us solve a problem that industry has created? My answer is *no*. We must face up to the fact that it is our fault.
>
> It is for this reason that I strongly urge you to adopt a resolution that no unmuffled machines will be produced after July 1, 1971 by any MIC member firm. While this may seem like short notice, let me remind you that the European manufacturers already have high performance, low noise exhaust systems, as required for ISDT and other forms of cross country racing.
>
> I would like to point out that eliminating this problem does not infringe upon the consumer's personal freedom, as do land closures and helmet laws. What the owner does to the exhaust system after he has bought the machine is a different matter. At least we will not be encouraging, or sanctioning, noise and wanton damage to the ecology. Unless we make the motorcycle more compatible with the environment we will, like the Indians, lose the battle.
>
> Only the MIC has the power to make this change. And if the MIC does not make the change, by the July 1 compliance date, it has shirked its responsibility, not only to all segments of the industry, but to the consumer and legislator as well.

At this point it is not really known what action the MIC will take regarding noise. It is interesting to note that an MIC news release announces that a guest speaker at the annual meeting, Assistant Secretary of the Interior for Land Management Harrison Loesch, told the MIC that noise is the big problem facing motorcycling. Mr. Loesche suggested quieter means of propulsion for motorcycles, such as electrically powered vehicles for use on public lands.

To most of us the idea of a battery powered motorcycle for all off-road use may seem absurd. But remember, They are not Us; they think differently than we do.

Then our friend Loesch went on to explain that: "Indiscriminate use of off-road vehicles can have an adverse effect on environment." He had to. Men like Loesch are under tremendous pressure from conservation groups. He knows full well that he can get more political support from the conservationists if he "lays it on the line" in a speech to the motorcyclists.

And that is what is unfortunate. Mr. Loesch said nothing that has not been said in this column several times in the past two years. It is really discouraging that a top dog in the federal government has to stand up and tell us what most of us already know (I hope he paid for his own dinner).

At the time of this writing, no less than 25 states have a total of 48 noise bills in the proposal stage.

CYCLE WORLD
ROAD TEST

MOTO-GUZZI V7 AMBASSADOR

IT'S A GOOD THING that tastes differ. Where, for example, would Moto-Guzzi be if everyone insisted on riding light, nimble motorcycles? Light and nimble the Ambassador ain't.

The big 750 is tank-like, in fact, and therein may lie a clue to its appeal. It looks bullet-proof, and that characteristic probably goes more than skin deep. In the course of a single working day at CYCLE WORLD, we receive a large pile of reader mail, much of which is devoted to moaning and groaning about the ills befalling a particular brand of motorcycle. Since the first 700-cc V-7 was introduced in 1967, and followed by the larger 750 in 1969, we have received no grave criticisms in the mail regarding this Italian V-Twin. Only praise. Even the local fuzz here and there are beginning to acquire Moto-Guzzis; considering the conservatism and pickiness of most police forces in regard to new equipment, this trend should tell you what they think about the Guzzi solidness and reliability. The influential LAPD has 85 of these machines in service, and even the California Highway Patrol has bought four of them for evaluation.

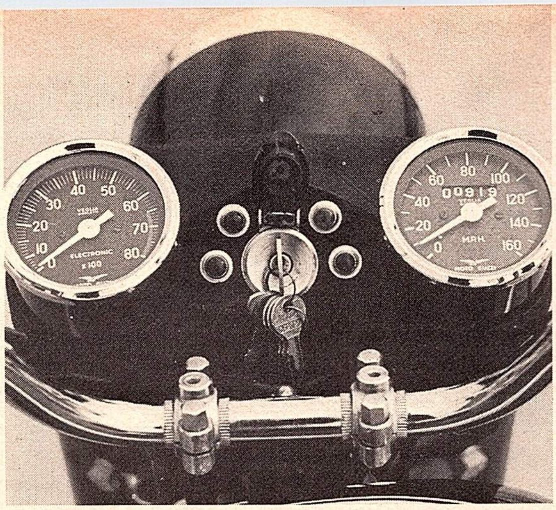
So what relevance does the Guzzi have in the civilian world? It is certainly not a sporting machine, in the sense that most American road riders have come to know. Rather, it is a heavy-duty tourer, with an Eldorado ride. It is half Harley (FLH) and half BMW, i.e., the kind of machine you would take on a short jaunt to Uruguay, or halfway around the world and back. Its heaviness would be an asset, for the tons of baggage and camping gear you'd take with you—mounted in the most unroadworthy places—would hardly be noticed.

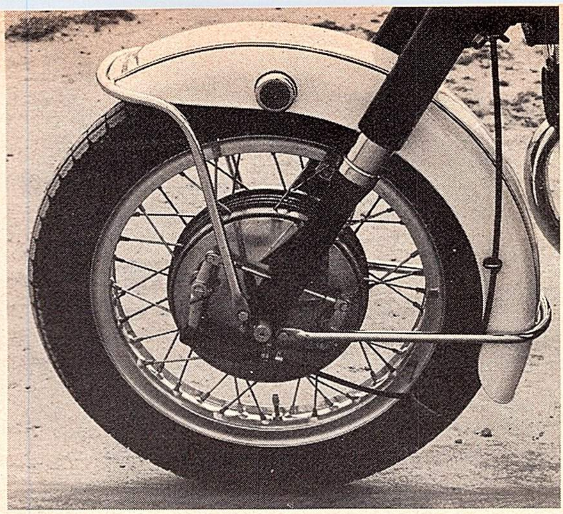
The 1971 version of the Moto-Guzzi is not much different than the first 750. Refinement, much of it in cooperation with police department clients, has been the keynote in the evolution of this machine. Externally, the machine looks much the same, a deceptively low silhouette, a blend of big, upthrust cylinder barrels, candy apple red fuel tank and side panels and smart white enamel fenders, pinstriped in red and black. The most noticeable innovation outside is a new instrument layout. Instead of the single speedometer unit surrounded by a polished aluminum housing, there is now a group of separate Veglia speedometer and tachometer units, and four idiot lights indicating neutral, oil pressure, ammeter and lighting status. The ignition key is also in this grouping, and the keyhole is protected by a small, swinging coverplate. The "dashboard" for this grouping is a dull black, preferable to the previous housing, which bounced annoying reflections into the rider's eyes. The layout is neat and simple, so we are reluctant to complain about the fact that the idiot lights aren't labeled, and are all red, except for the yellow neutral light. And the tach needle, on this machine, was a wiggler.

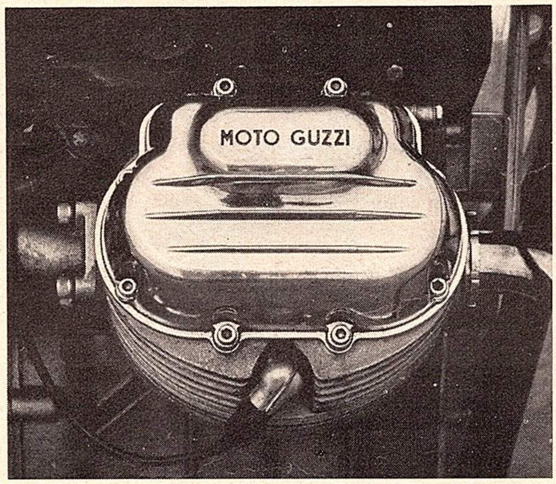
Another barely noticeable change cleans up the side view of the motorcycle; the battery covers now extend to cover the air cleaner.

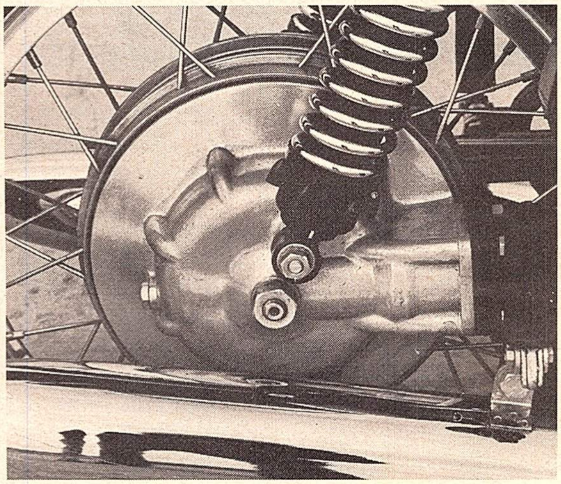
Internally, the most important modification occurs in the clutch throw-out bearing, which was of the caged ball variety and was predisposed to early failure. This is now replaced by a needle bearing. The clutch operating arm mounting is also strengthened by a bigger screw.

The Guzzi's engine could be described as a "perfect configuration" V-Twin. Its 90-degree cylinder angle permits 100 percent balancing to cancel primary vibration, at the small









Yes, Virginia, There Is An Alternative To The Electraglide Or The BMW.

cost of adding a minimal rocking couple, due to the fact that the connecting rods run slightly offset on the same crankpin. The elimination of primary imbalance is the reason that BMW's Twins have a 180-degree cylinder configuration. A slight advantage accrues to the choice of a 90-degree V in that it tucks the cylinders up and out of the way, making the engine package more compact. However, the firing sequence of two cylinders offset at 90 degrees is uneven. So the Guzzi, at engine speeds just above idle, jiggles with the staggered rhythm of a reducing belt machine at a ladies' health spa. Fortunately, for those of us who don't want to lose weight, these oscillations smooth out quickly above 1500 rpm.

As can be expected in any tranversely mounted engine, where the crankshaft is running parallel with the frame, the Guzzi manifests a torque reaction that pushes the machine to the side when you turn the throttle on or off. This is mainly felt when the machine is not in motion.

The reasons for mounting a 90-degree V-Twin transversely in the frame are actually three.

One, it fits better, particularly in the case of the Guzzi, which has a deep, finned wet sump crankcase.

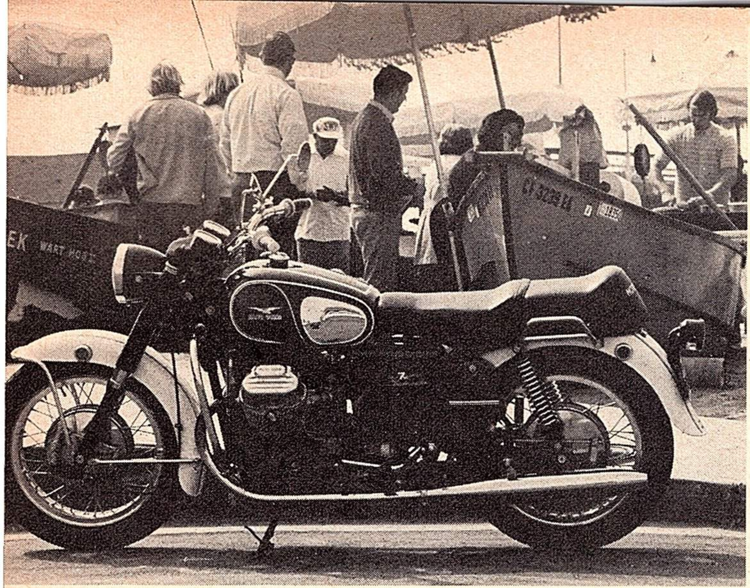
Two, the most important, transverse mounting is peculiarly appropriate where shaft drive to the rear wheel is to be employed. The driveshaft rotates in line with the frame, and it is desirable that the crankshaft do so too, if the mechanical weaknesses and inefficiencies of changing rotational direction 90 degrees are to be avoided. By way of contrast, the 45-degree Harley Twin, a more compact "V," is mounted longitudinally in the frame and therefore drives the rear wheel with a chain. The new 750 Ducati, a 90-degree V layout, is mounted longitudinally and uses chain drive also.

Three, transverse mounting allows the Guzzi's frame to be kept low, benefiting the short rider, and at the same time keeping the cylinders out in the cooling airstream. The transverse mounting also scores well for easier maintenance, not to mention the aesthetic benefits of hiding the busy clutter of electrical components—generator, distributor, wires, etc.—behind those cylinder barrels.

The engine is basically set up to be a tractable "torquer." It displaces 757cc but is rated at 60 bhp at a modest 6500 rpm. The carburetors, a pair of Dellortos, are of moderate choke size, 29mm. Flywheel effect, produced by a massive crankshaft, flywheel, ring gear, etc., is quite pronounced, making for sedate throttle response, and a not-too-subtle leaping effect during rapid gearshifts. The flywheel effect, of course, is quite advantageous at low engine speed. It may be pottered through a 25-mph zone in high gear with incredible smoothness. Its sedateness should not be construed with slowness. This great Beastie will definitely move out, unless 86-mph quarters don't impress you.

Conservative engine design, automotive in character, is the keynote of the Guzzi. The crankcase, cylinders and cylinder head are in light alloy. Alloy pistons, with four rings, run against long wearing hard-chromed barrels. The overhead valves are pushrod operated, both pairs by a single camshaft in the crankcase cavity above the crankshaft.

Plain bearings are used to carry the one-piece forged crankshaft, as well as the connecting rod big and small ends. Accordingly, the oil lubrication system operates at a relatively high 54 to 60 psi, controlled by a pressure relief valve. The



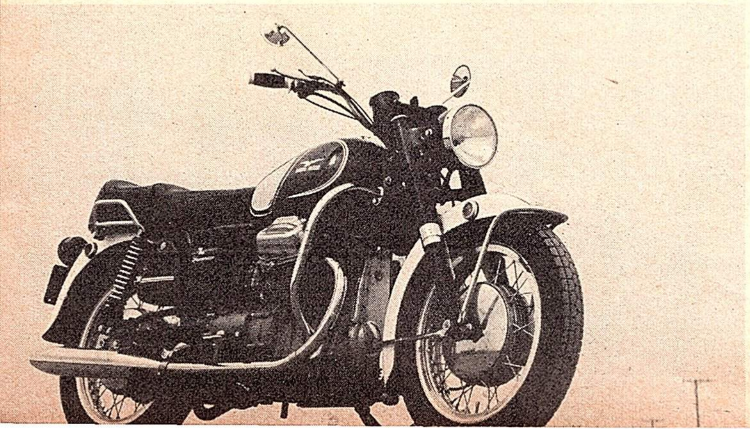
crankcase is unusual in that it is of one-piece construction, which both increases strength and eliminates oil seams; the crankshaft may be removed easily from the rear, though, after removal of the clutch/transmission unit.

A heavy-duty double-disc dry clutch transmits power to the four-speed transmission. The clutch is virtually slip-proof, and the transmission, operated by a double-tang foot lever in a one-up-three-down pattern on the left, is smooth and sure-shifting. However, the heftiness of gearbox components makes for some noticeable clunkiness, especially during rapid upshifting, or during uncareful downshifts. The important thing is that, in spite of the unruly noises inherent to this unit, it always clunked *into* gear under any situation. It never bounced out or jumped into a false neutral. When the machine was at rest with the engine idling, it was quite easy to slip into the neutral position between first and second gears.

The automotive theme is carried into the electrical system. The bike is a push-button starter, by means of a 0.7 bhp, 12-V motor driving directly to the flywheel through the starter ring gear. There is, in fact, no auxiliary kick starter, nor need there be. The battery, which weighs about 28 lb., is rated at 32 amp/hours and the generator is a belt-driven 25-ampere, 300-watt Marelli, more than enough to drive the starter motor, lights and host of accessories necessary for police work.

The maintenance aspect of the bike is quite encouraging. A backyard mechanic can only smile at all the big bolts and hefty filler plugs, all easy to reach and promising immunity to mauling from the most gauchely handled economy size crescent wrenches.

Pleasant surprises are due when you first swing a leg over the Guzzi. Seat height is low. This, of course, means that you can firmly plant your feet on the ground when the machine is stopped. The seat itself is an orthopedic marvel. It is soft, well-shaped to support the thighs. Halfway along the seat, a step rises to support your tailbone. The passenger sits under similar circumstances. It is about the closest thing to dual bucket seats that a motorcycle can have—short of looking outrageous. The relationship of seat, footpegs and handlebars is comfortably compact. The bars are the typical American-style wide variety, but not too wide, nor too high. Thus the rider ends up leaning forward slightly, a good position at freeway speeds.



Suspension seems slightly stiffer than on the first 750 we tested, and the new machine didn't have as much tendency to heave up and down on acceleration and deceleration as did the old one. Front end damping seems improved. A small lack in rebound damping ability is indicated at the rear, for the Guzzi gallops somewhat in recovery from a briskly crossed rain gutter or severe "thankyoumam."

Cornering will be accomplished in comfort with the Guzzi, although not with the same elan that one associates with a sports-oriented roadster. For one thing, the front end is heavy feeling. The combination of front suspension, instrument panel and a headlight mounted way out in front is in fact a heavy one. Combine this with a wheelbase of nearly 58 in. and you have a slow steering motorcycle. The jerky effect of a heavy flywheel and the heavy weight of the machine do not lend themselves to "stuffing" the bike into a hairpin, or scraping the pegs in a faster bend. But within its limits, the Guzzi is solid feeling, imperturbable, and secure in its mission—to maintain a steady high cruising pace for hours or days on end.

Braking is just short of phenomenal, but quite a bit of hand lever travel, and pressure, is required before the front tire starts making nervous sounds. Yet, stopping distance figures reveal that the Guzzi is in the ballpark with the best big bore machines weighing 100 lb. less. The worst part of the stopping phase occurs in the 30-0 mph range. This is probably due to the bike's cumbersome feeling at slow speed. Controllability of a machine, or confidence therein, has much to do with the results you get in a braking test. It is no surprise, therefore, to discover that most bikes weighing less than 400 lb. do better (assuming adequate brakes) than the heavier ones, at least in the 30 to 0 stop. However, heavier bikes like the Guzzi have as good a chance to do as well as the lightweights in a 60 to 0 stop. We noticed some fade in repeated brisk stops from high speed as the front drum stored heat. However, the effect is not serious, and highly unlikely to be encountered in typical Guzzi riding. The rear brake is effective, although the foot lever is an inch too far from the footpeg for the most convenient control.

Highway cruising, as expected, is a calm, effort-free experience. The Guzzi transmits vibration to the rider only during heavy acceleration, particularly from low rpm, but is actually quite smooth as engine speed approaches the 6500-rpm redline. Both exhaust and mechanical noise level are low; the latter is quite surprising, considering the length of the pushrod valve gear and the exposed cylinders and heads. Part of the excellent mechanical quietness is due to the close tolerances and tight clearances used in this engine. The Moto Guzzi manual indicates just 0.0021-.0025 clearance for the pistons. That and the four-rings (two compression, two oil control) make for slap-free, quiet running.

What then is this creature, the Moto Guzzi? It is in a league with the FLH or the BMW, yet has its own individuality. In weight, it is in between the two. It has much of the character that pleases the riders of these other two brands. Solid comfort, longevity, calmness, heft. In spite of its slight unwieldiness below 20 mph, it scores as good or better than the other two in traffic. Its two-up behavior on the freeway is outstanding, and passenger comfort is excellent.

It will surely please the rider who likes to take his joys quietly, in great, gamboling doses. ◙

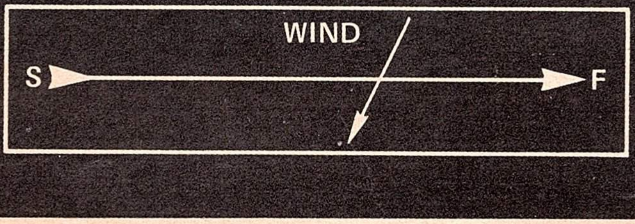
MOTO-GUZZI V7 AMBASSADOR

SPECIFICATIONS

List price	$1694
Suspension, front	telescopic fork
Suspension, rear	swinging arm
Tire, front	4.00-18
Tire, rear	4.00-18
Brake, front, diameter x width, in.	8.66 x 1.66
Brake, rear, diameter x width, in.	8.66 x 1.66
Total brake swept area, sq. in.	90.1
Brake loading, lb./sq. in.	7.28
Engine, type	four-stroke ohv V-Twin
Bore x stroke, in., mm	3.26 x 2.75, 83 x 70
Piston displacement, cu. in., cc	46.2, 757
Compression ratio	9:1
Claimed bhp @ rpm	60 @ 6500
Claimed torque @ rpm, lb.-ft.	N.A.
Carburetion	(2) 29-mm Dellorto VHB
Ignition	coil and battery
Oil system	gear pump, wet sump
Oil capacity, pt.	7
Fuel capacity, U.S. gal.	5.84
Recommended fuel	premium
Starting system	electric
Lighting system	12V, battery
Air filtration	dry paper
Clutch	twin-disc, dry
Primary drive	gear
Final drive	shaft
Gear ratios, overall:1	
5th	none
4th	4.51
3rd	5.73
2nd	8.01
1st	13.41
Wheelbase, in.	57.5
Seat height, in.	32.0
Seat width, in.	12.6
Handlebar width, in.	32.6
Footpeg height, in.	11.5
Ground clearance, in.	5.8
Curb weight (w/half-tank fuel), lb.	525
Weight bias, front/rear, percent	45.5/54.5
Test weight (fuel and rider), lb.	655

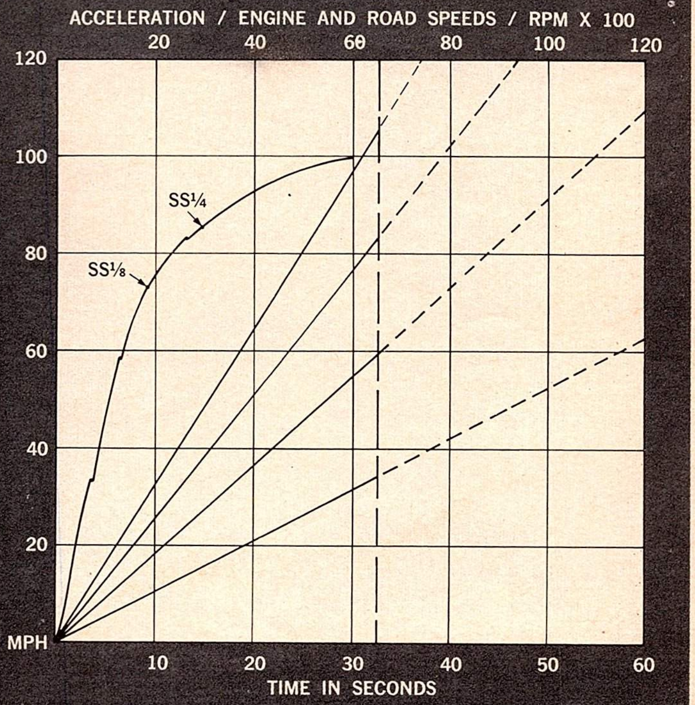
TEST CONDITIONS

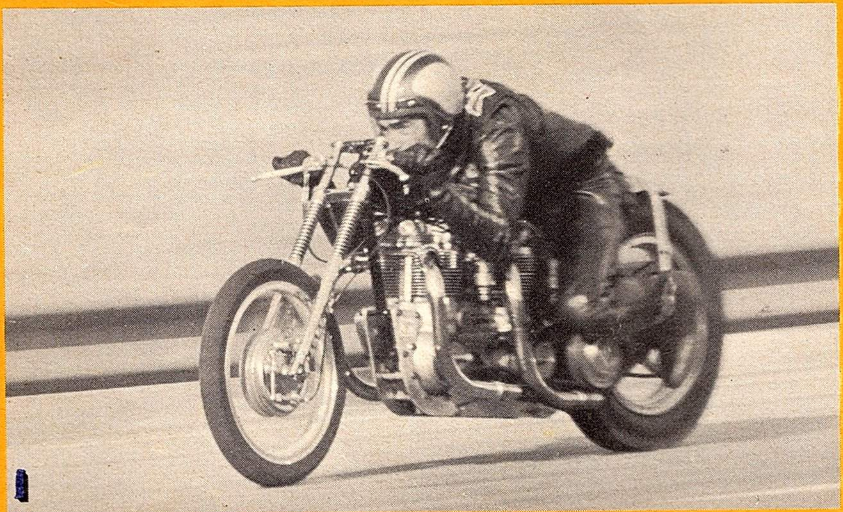
Air temperature, degrees F	68
Humidity, percent	45
Barometric pressure, in. hg.	30.31
Altitude above mean sea level, ft.	50
Wind velocity, mph	3-6
Strip alignment, relative wind:	



PERFORMANCE

Top speed (actual @ 6180 rpm), mph	100.55
Computed top speed in gears (@ 6500 rpm), mph:	
5th	none
4th	105
3rd	83
2nd	59
1st	34
Mph/1000 rpm, top gear	16.2
Engine revolutions/mile, top gear	3700
Piston speed (@ 6500 rpm), ft./min.	2975
Lb./hp (test wt.)	10.9
Fuel consumption, mpg	42
Speedometer error:	
50 mph indicated, actually	45.0
60 mph indicated, actually	55.0
70 mph indicated, actually	64.9
Braking distance:	
from 30 mph, ft.	34.6
from 60 mph, ft.	121.0
Acceleration, zero to:	
30 mph, sec.	3.1
40 mph, sec.	4.2
50 mph, sec.	5.1
60 mph, sec.	6.7
70 mph, sec.	8.6
80 mph, sec.	11.6
90 mph, sec.	15.9
100 mph, sec.	23.4
Standing one-eighth mile, sec.	9.21
terminal speed, mph	73.58
Standing one-quarter mile, sec.	14.94
terminal speed, mph	85.63

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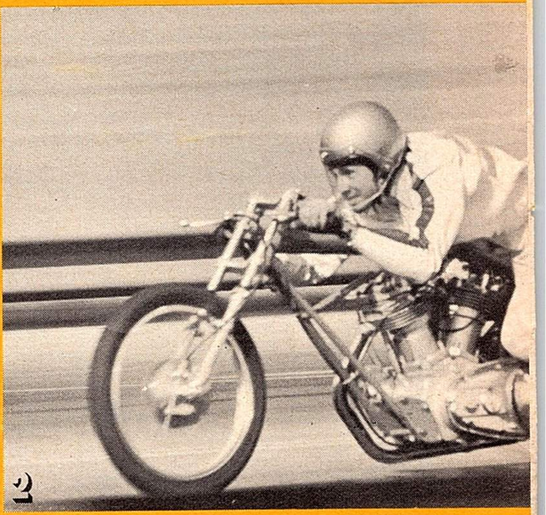
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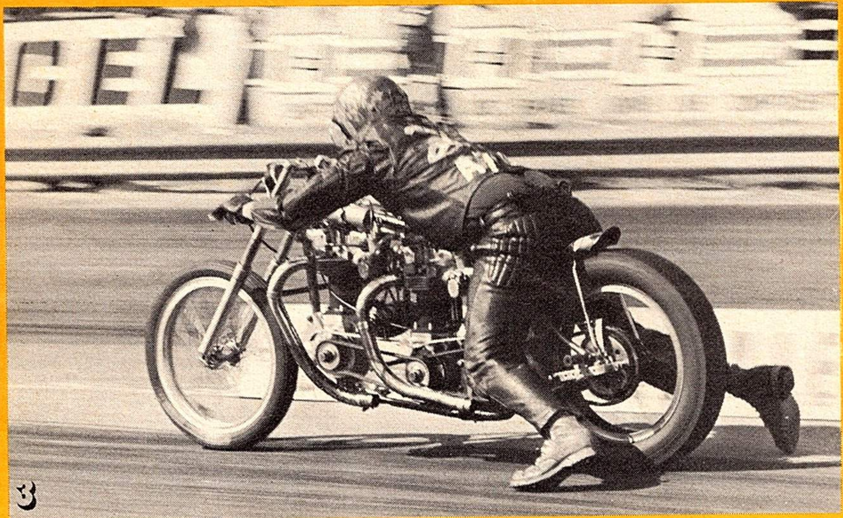

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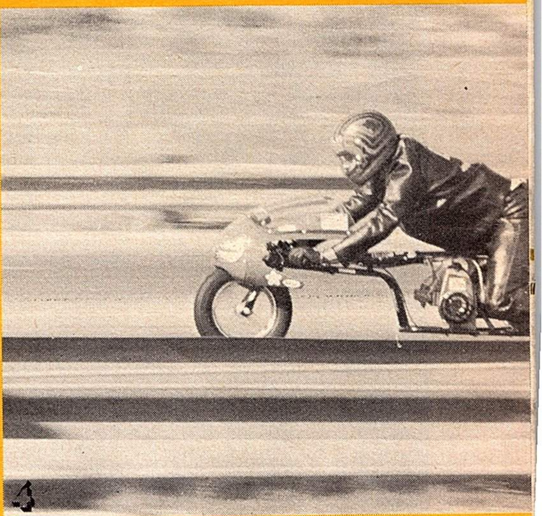
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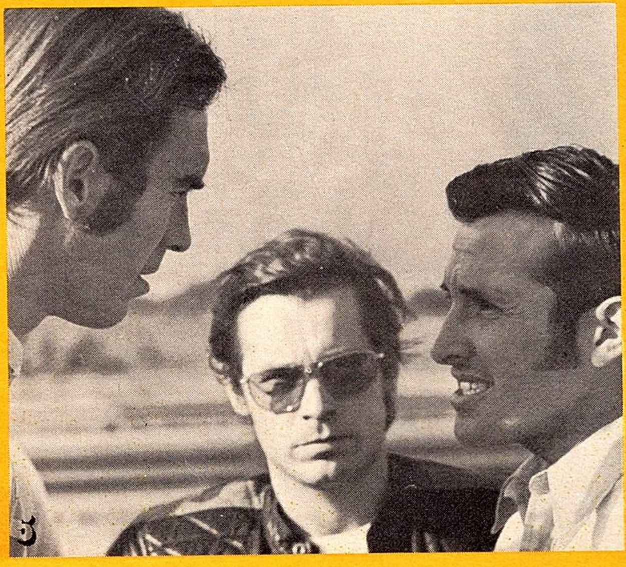
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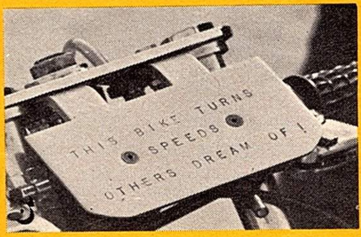

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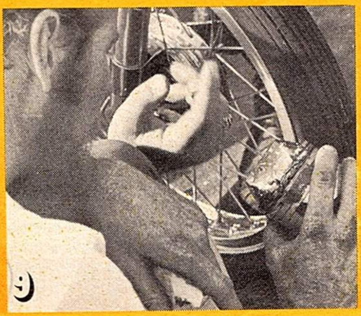
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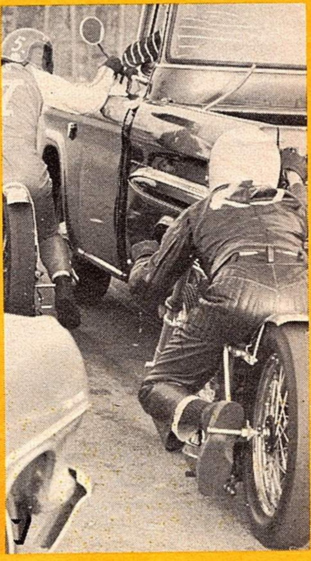

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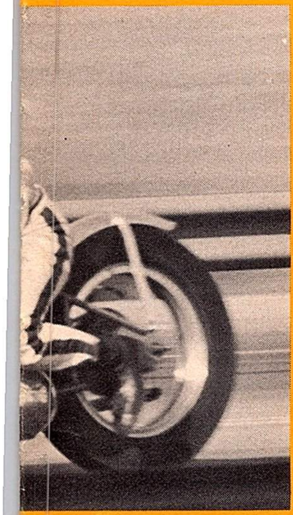
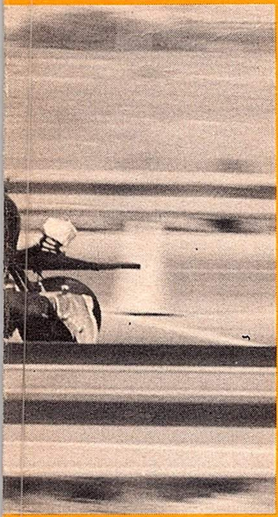
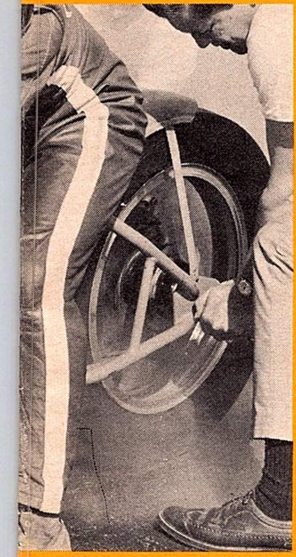






Photos by Dave Gooley

THE IRWINDALE NATIONALS

BY BOB SANFORD

When $6500 Waits In The Tower, A Winner Not A Record Holder Be!

BORIS MURRAY, the nation's current top speed record holder for the quarter-mile (166.35 mph), blasted his twin Triumph to a 9.47 elapsed time victory (159.85 mph) over favored David Campos in the final round of Top Fuel Eliminations at the NHRA sanctioned, second annual United States Fuel and Gas Motorcycle Nationals, held at Irwindale, Calif.

Murray's win followed by only minutes the final round victory of Sonny Routt in the Top Gas Eliminations. Routt, also aboard a twin Triumph, aced out Larry Joe Yaeger with a run of 10.64 sec.

More than 100 of the Top Gas and Fuel bikes from throughout the country were on hand to try for a share of the $6500 purse (counting contingencies), including the sizeable crew from House of Wheels in Houston, Texas, led by Pat

→

1
Big Boris, with a little bit of luck, bored on to the pay window against an onslaught of quicker times.

2
Murray had to contend with Dave Campos' sanitary Harley, which set a new NHRA elapsed time record of 9.14 sec. earlier in the day.

3
Sonny Routt's double Triumph was running for Top Gas money, and turned the best speed in that class: 139.53 mph.

4
Who gave him a landing permit? It's a McCullough-engined special, which came to life with an 86-mph run after initial tuning problems.

5
Three of the best, in conference: (from left) Murray, Raslowski and Campos.

678&9
Vignettes: Murray's slogan, a touch of Muhammad Ali; tow starts for skittish fuelers; the traction-improving burnout; Jerry Cox' blown piston.

THE IRWINDALE NATIONALS

But David Campos did. The Albuquerque, N.M., Harley rider qualified in the number two spot with a run of 9.15 sec. And then in the third round of eliminations, Campos turned in a 9.14 against Danny Johnson, to give him the national e.t. record by just one one-hundredth of a second. Campos went on to defeat Jim Lineweber, aboard Clem Johnson's Vincent "Barn Job," to advance to the finals.

Miller and his triple-engine Yamaha. As usual, though, most of the bikes were Harley-Davidsons, except for the aforementioned Triumphs, a Vincent or two, a couple of BSAs, an occasional Honda, and a twin McCullough streamlined minibike.

Rain had fallen sporadically over Southern California during the previous week, and there were dire predictions of the second annual Irwindale rain-out. But the sun made a miraculous appearance first thing Saturday morning, and did not so much as blink during the two-day meet. Track officials had done an outstanding job of promoting the event, and, although sparsely attended on Saturday, drew an estimated 5000 fans for the finals on Sunday. At least 500 of the spectators arrived on bikes, running the gamut from Honda Trail 90s to Kawasaki Mach IIIs to super-sanitary Square Four Ariels.

Qualifying started Saturday, and last year's winner and national elapsed time record holder, Joe Smith, wasted no time in turning a 9.09-sec. run, 0.06 sec. faster than his record. This gave him and his Harley-Davidson the top qualifying position, but he wasn't able to produce the required back-up run (within one percent) to establish a new national record.

Murray, the veteran rider and frame builder from La Verne, Calif., had his toughest battle in the second round, where he was paired against Smith. But Smith turned in a disappointing 9.50, and Murray advanced to the semi-finals with a run of 9.38. Murray turned in his best run of the meet in the semis, when he turned a 9.35 in defeating Sonny Raslawski's H-D.

So the stage was set with Campos, who had not turned more than 9.28 throughout the meet, emerging as the odds-on favorite. Murray, however, had other ideas, and brought his 1300-cc Triumph to the line, after making a last minute change to an M&H tire. (The company, incidentally, offered a sizeable contingency award to the Top Fuel winner using their product.)

After burn-outs, the pair staged and the countdown began. Murray was just a hair quicker out of the hole, but both were away in smoke. Murray cleared first and began to pull away. However, Campos and his big Murray-frame Sportster weren't far behind and looked like they might close the gap. But no such luck. Campos blew his engine just before the light, and the tall, thin pro went through for the victory.

Routt also had a bit of luck in gaining the Top Gas championship. Top qualifier, Ron Fringer, was defeated by Bob Petrie in the first round, and last year's Gas winner, Harold Eide, and runner-up, Marv Jorgenson, both went down with mechanical problems.

Mike Tedder of Lawndale, Calif., took Top Street Eliminator on his Honda Four, when Kawasaki's Tony Nicosia red-lighted in the final round. Additionally, the following new national records were set:

A-FUEL BIKE:	*Dave Campos*	*Albuquerque, N.M.*	*H-D*	*9.14 e.t.*
D-FUEL BIKE:	*Tony Nicosia*	*Azusa, Calif.*	*Kawasaki*	*11.55 @ 123.62 mph*
C-GAS BIKE:	*Ron Teson*	*Lakewood, Calif.*	*Honda*	*11.31 @ 121.29 mph*
F-GAS BIKE:	*Cheryl & Russell*	*Houston, Texas*	*Yamaha*	*11.27*
F-GAS BIKE:	*Ron Knapp*	*Covina, Calif.*	*Yamaha*	*122.78 mph*
G-GAS BIKE:	*Chris Young*	*Santa Ana, Calif.*	*Suzuki*	*12.17 @ 108.69 mph*
B-STREET BIKE:	*Russ Collins*	*Torrance, Calif.*	*Honda*	*114.35 mph*
C-STREET BIKE:	*Mike Tedder*	*Lawndale, Calif.*	*Honda*	*12.09 @ 110.83 mph*
D-STREET BIKE:	*Tony Nicosia*	*Azusa, Calif.*	*Kawasaki*	*12.42 @ 115.23 mph*

A VISIT WITH CLEM

BY BOB SANFORD

Remember The Barn Job? The First To Go 140, Then 150, Then 160? Now It's A Good Also-Ran. Can Clem Get It Back On Top? Or Will His Love For This Hand-Built Marvel Wither And Finally Succumb To His Urge To "Junk It And Get A Harley?"

It was the 1950's, and the country was mesmerized by chino pants, sputnik, greasy duck-tail haircuts, Hadicol, Ike, Elvis Presley and such all time movie greats as "Hot Rod Rumble." Hollywood, in fact, had just discovered teen-age subculture as plots for low-budget films—not to mention, of course, as a sizeable group of people with money to spend on movie tickets. Cinematically, Young America was portrayed as Pat Boone and/or Tab Hunter and/or Sal Mineo, who would drive a couple of dozen kids through town and down to the Malt Shop in a rumble-seated, Model "A" Ford Hot Rod. Arriving at their destination, the group would "pile out" over the side, the array of saddle shoes, penny loafers and white bucks hitting the pavement almost simultaneously. And once inside, the girls (Tuesday Weld and/or Ann-Margret and/or Annette Funicello) would sit atop their piles of crinolines, demurely sipping their sodas, while the boys, periodically combing their greasy hair and snapping their fingers in time to the latest Dion "Platter," would talk about Pat Boone's and/or Tab Hunter's and/or Sal Mineo's Model "A" being "real gone," or "Sano," or "Cherry," etc., etc. At some point during the movie, there would be a "grudge race" at the local drag strip, with Pat Boone, and/or Tab Hunter and/or Sal Mineo shutting down the bad guy and winning Tuesday Weld and/or Ann-Margret and/or Annette Funicello.

Well, young, middle America pretty much bought what Hollywood had to say about them, and for awhile it looked like drag racing might overtake professional baseball as the National Pastime. New drag strips began to pop up all over the nation and no one under 25 years old would be caught dead without "duals" and a "four barrel" on their '49 Merc. Speed was the order of the day.

IN THE MIDST of this era, a young man, who had recently moved to Southern California from Buffalo, N.Y., rode his Vincent motorcycle to spectate a drag event at Pomona, Calif. He was a mechanic by trade and machinery and competition had always held a special fascination for him. ("And drag racing," he was to say almost 20 years later," seemed to me to depend more on the machine than the rider.")

Next week, the same young man was back at Pomona, but this time as a participant on his street-legal Vincent. And the next week the lights on his bike had disappeared. Then off came something else. An addition would be made, here a change, there a change.

Finally, in 1960, a motorcycle that was to become legendary on America's drag strips emerged, its hand-made and super-secret parts covered by those familiar Vincent casings.

→

A VISIT WITH CLEM

Clem Johnson and his famous "Barn Job."

For the majority of the next decade, the Barn Job terrorized drag races throughout the country, becoming the first motorcycle to crack the 140-, 150- and 160-mph barriers, as well as first to break the magic 10-sec. elapsed time mark. Johnson's machine was the Ferrari among Fords, the aristocrat of the two-wheeled world. Nothing and no one could hold a candle to him.

In the days when everyone else was striving for machines weighing 300 lb., the Barn Job weighed in at a cool 250. While others were struggling at 120 mph, the Barn Job would whiz through the "eyes" at 151.51. For more than five years, Johnson held both the elapsed time and Top Speed national record. This was it. The ultimate in single-track drag equipment.

Well, Tab Hunter is self-exiled in Europe, Annette Funicello is a middle-aged housewife, "Love Story" has replaced "Hot Rod Rumble," hair is long and greaseless, Pat Boone is busy saving kids from drugs, slow VWs are more stylish than hot '49 Mercs, and drag racing no longer seems in danger of replacing baseball.

But what of Clem Johnson and the Barn Job? They are, thank you, alive and well in West Covina, Calif. Furthermore, the Barn Job is no less than fifth best among Top Fuel bikes in the country.

"And," Johnson said a day or two after being eliminated in the semi finals of the NHRA Top Gas & Fuel Nationals, "I say we're going to get up on top again."

Clem Johnson lives in a modest suburban neighborhood, some 30 miles from Los Angeles. He is a 39 1/2-year-old bachelor and shares his house with a 21-year-old cat and a 20-year-old motorcycle. There is a swimming pool on the back patio, about half-way between the immaculate house and the super-immaculate work shop. His once wavy black hair is now predominately gray, but he still has the appearance of a young man. It is doubtful that anyone would call him middle-aged.

He is articulate, but seems shy, as he speaks softly and slowly, very seldom looking at you when he talks. Somehow, he does not seem like a man who has ridden a motorcycle at speeds exceeding 160 mph.

His partner and head mechanic, Ralph Owen, is also there, and he, it seems, would gladly do all the talking. He is definitely not shy. Owen once owned the "biggest damn Harley in the world," but he shucked it and went in with Clem. The two now get together a couple of times a week to work on the bike and brainstorm for new go-fast ideas.

Somewhere during the course of the conversation, you get the feeling that a lot of the enthusiasm of earlier years has disappeared. Words like "antiquated," "vintage" and "has-beens" occasionally pop up in the conversation.

The problem, they say, is with all of the new store-bought, snap-on, bolt-up speed equipment available through your local dealer or mail order houses. It is impossible, they contend, to compete against this sort of thing with a machine that has, for all intents and purposes, been hand-built from the ground up. "Someday," Clem says rather wistfully, "I'm going to junk it and get a Harley."

At the same time, though, there is still enthusiasm, as the two talk and scheme about ways to "get back on top" with the big Vincent. For one thing, they have just discovered that the oil pump is unsatisfactory and are planning ways to alleviate that situation.

Then there's the problem of getting rid of the battery and fitting the magneto that's been kicking around in the closet for some time.

And, of course, the supercharger they purchased 2½ years ago, which they plan to put on only after the bike goes 170 mph. But right now, it's the oil pump. Then, Clem says, they can get on with the "mile-long list of things to do."

But, five minutes later they tell you

(Continued on page 106)

1&2

Clem maintains, improves, tunes and even starts the "Barn Job," but leaves the riding to Jim Lineweber.

3&4

Early "Barn Job" (1966), and late "Barn Job" (1971). The wheelbase is now longer, and the profile is much lower.

5

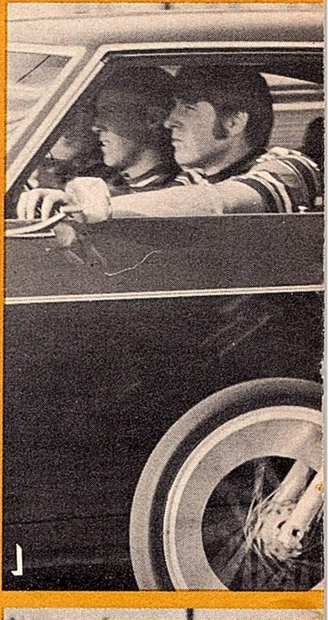
The only thing Vincent about Clem's machine are the cases, cylinders and timing covers. The rest is pure Clem, hand crafted.

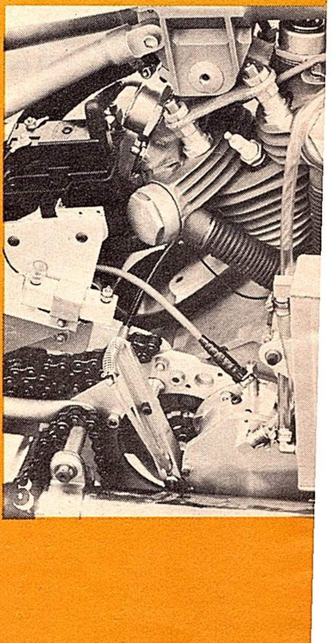
6

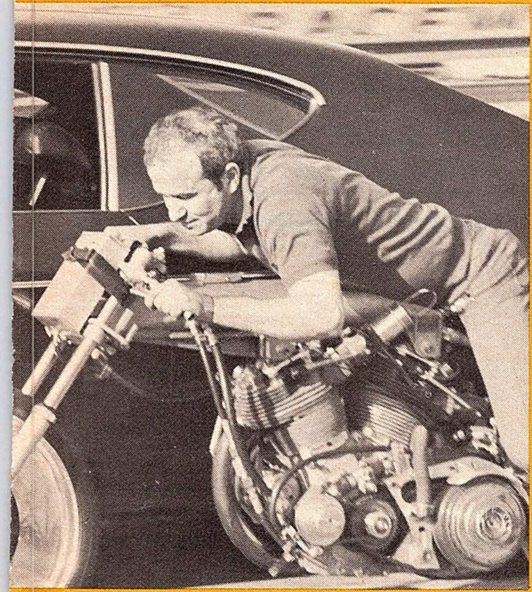
A machinist's dream, "Barn Job's" crankshaft assembly.

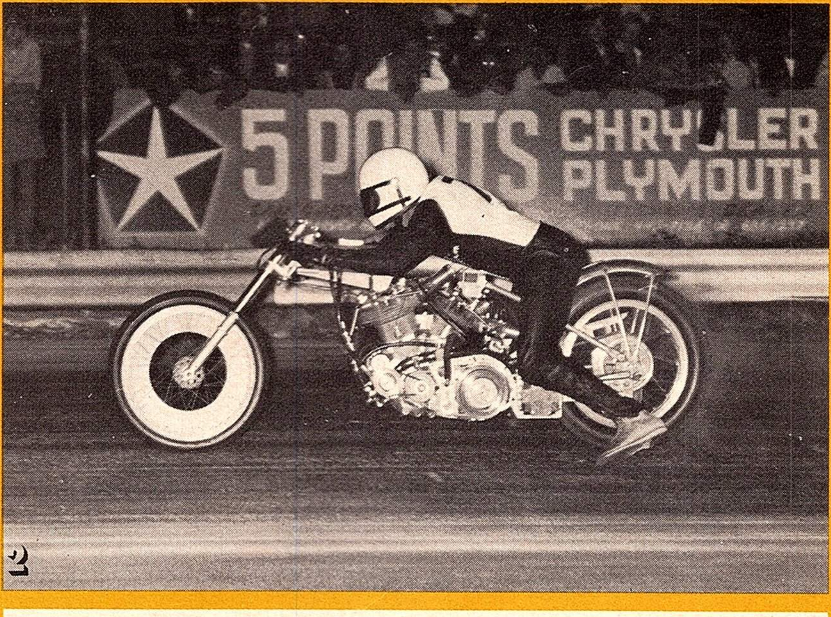
7

Fuel is carried in Clem's own aluminum alloy backbone frame.









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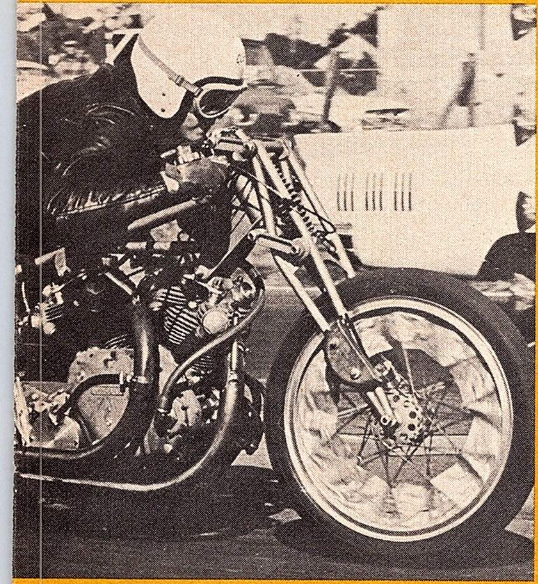

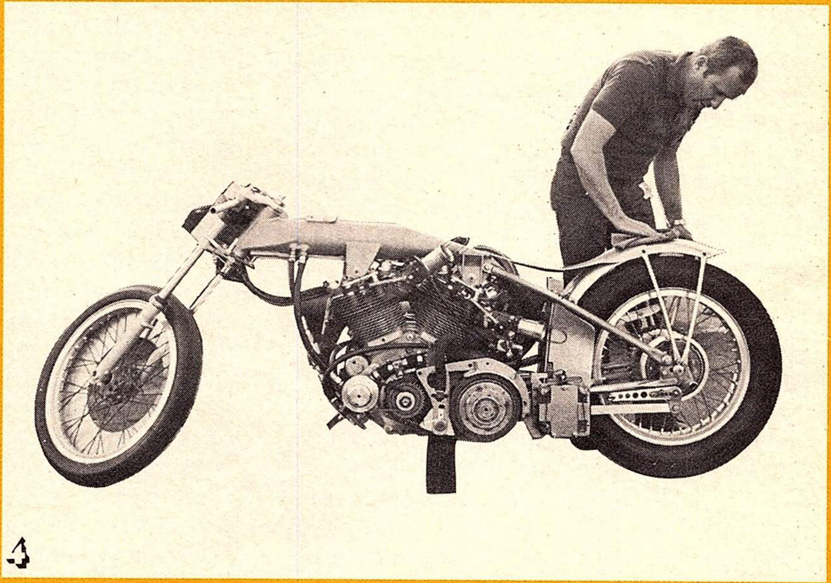

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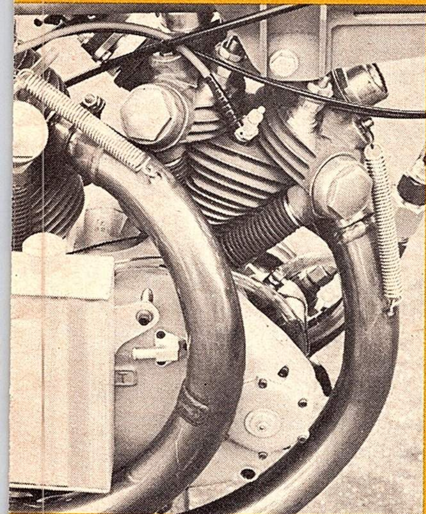
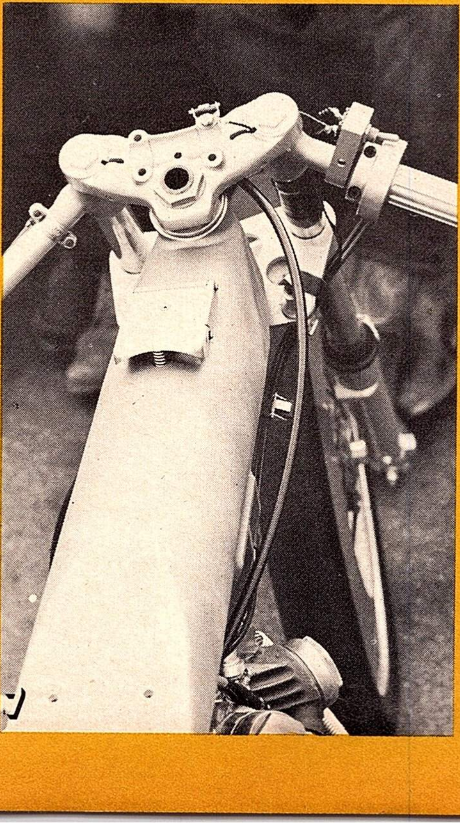




7

6

Photos by Dave Gooley and Dan Hunt

SUZUKI T-250R

Suzuki's Latest 250 Roadster Is Bullet-proof. It Shares The 350's Crank Assembly. And Two-Up May Find Happiness Thereon.

CYCLE WORLD
ROAD TEST

IN 1965, the Suzuki X-6 was just about the fastest 250 two-stroke Twin to be had. CYCLE WORLD's road test of the first X-6 in the October, 1965 issue showed a 15.3-sec. standing quarter-mile with a trap speed of 84 mph. An impressive 92-mph top speed was attained, a good speed for most 350 machines then available.

But the first X-6s had their drawbacks. The overall finish looked good for a while, but the paint had a tendency to fade and the chrome rusted in a short time. And the transmission was plagued by uncertain shifting and damaged gears. The clutch was a little jerky in operation and tended to heat up when used extensively. But they were *quick!*

For the 1969 model year Suzuki redesigned the X-6 and introduced the T-250 and T-350 series, each using the same crankcase assembly. The T-350 is different from the T-250 in its larger (61mm) bore, for an actual displacement of 315cc, and a higher final reduction ratio, but the machines are virtually identical in appearance. That should give a clue to the relative strength of the T-250's engine components. The engine is as close to "bulletproof" as any machine we've seen lately. Although a tad slower than the X-6, it's a welcome trade-off for reliability.

The main differences in the engines of the X-6 and the T-250 lie in the cylinders and transmission. The T-250's cylinders are of six-port design and use larger (26mm) carburetors as compared to the 24-mm units employed on the X-6. The transmission's gear ratios were altered slightly and Keystone-type shifting dogs are now fitted for more positive "locking-in" of the gears. The Keystone-type dogs are cut at greater than a 90-degree angle, while the receiver slots in the gears are cut at less than a 90-degree angle by the same amount. This makes for a very positive shifting, with little chance of the machine's jumping out of gear.

Other detail changes from the X-6 include slightly different crankcase die castings, with the oil pump now mounted on top of the right, rear side of the transmission cavity.

As far as most two-stroke Twins go, the T-250R is quite conventional. Induction is handled by piston-controlled ports which are simpler than a rotary-valve design, and the crankcases, which are split horizontally, make it an easy matter to repair the transmission without disturbing the crankshaft or pistons. Because the oil level in the transmission/clutch is generally below the seam, very little leakage occurs, and the number of necessary seams is reduced.

The T-250R's transmission is well designed and executed. Both the mainshaft and the layshaft turn in ball or roller bearings, and the gears which rotate around the shafts are supported by needle bearings. All ratios are indirect, and shifting is accomplished by the use of cam slots in a rotating drum, as with other Suzuki models. A nice feature here is the incorporation of a positive stop to keep the drum from turning too far during a vigorous shift, which could result in missing the next gear completely and winding up in a false neutral.

Another nice touch is the neutral brake, which applies a force to the low gear pinion engaging with the low gear as it is being selected. This keeps the transmission from grinding, and ensures positive selection of low gear. With six speeds, the transmission shows the T-250R's racing heritage and might be considered superfluous by some. But being able to snick the silky smooth lever in either direction to get just the right gear for the job is a feature appreciated by all our testers, and even more so when packing double in hilly country.

Strong power is available from the six-ported cylinders beginning at just under 4000 rpm and continuing right up to almost 8000 rpm. At higher speeds, vibration increases and power falls off rapidly, signaling the rider that it's time to shift. The noise output certainly won't tell him much, as the super silent exhausts and extraordinarily quiet (for a two-stroke Twin) intake system are all but drowned out by the noise of the wind rushing by. Tractability at low engine speeds is quite good, but it is better to use the gearbox to keep the engine "on the boil" and the power coming.

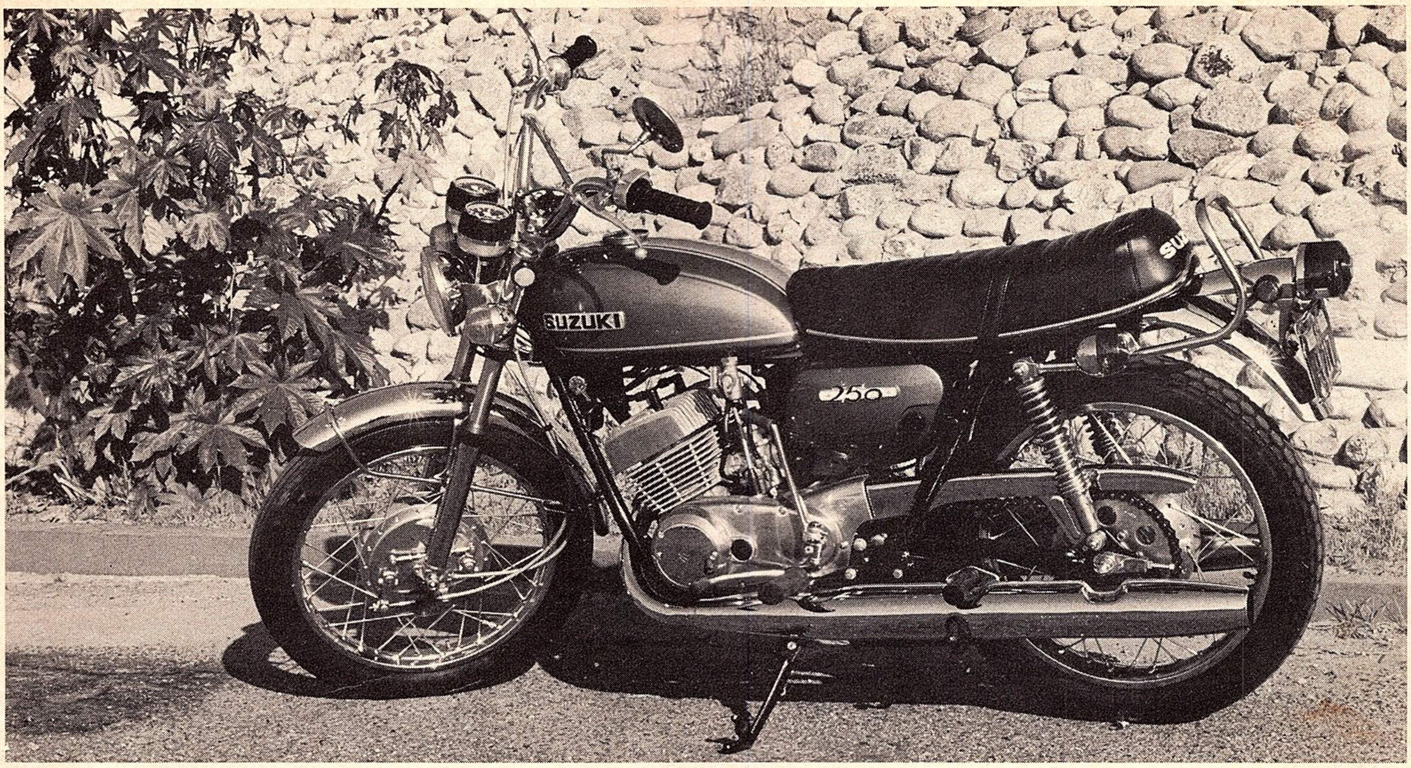
Suzuki's "Posi-Force" lubrication has been changed in name to CCI (crankcase inject), but not in operation. Oil from the remote tank is fed directly into the right and left main bearings and the cylinders by a variable-displacement, piston-type pump, which increases its output when the engine speed and throttle opening are increased. Oil which first lubricated the main bearings travels through the inside of the crankpins and lubricates the connecting rod big end needle bearings, and then joins with the oil which was injected into the cylinder areas to lubricate the pistons and the connecting rod small end (wrist pin) needle bearings.

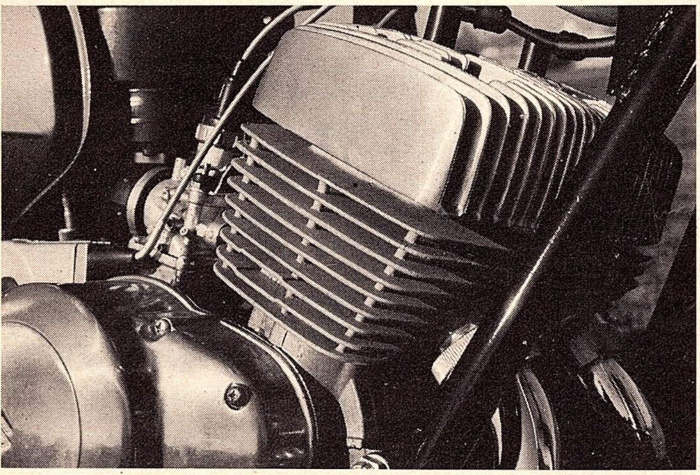
The center main bearing, however, is lubricated by gravity-fed oil from the transmission's oil supply. A sediment trap below the bearing is capped with a drain plug (one of three under the engine) to allow the removal of trapped particles during an oil change.

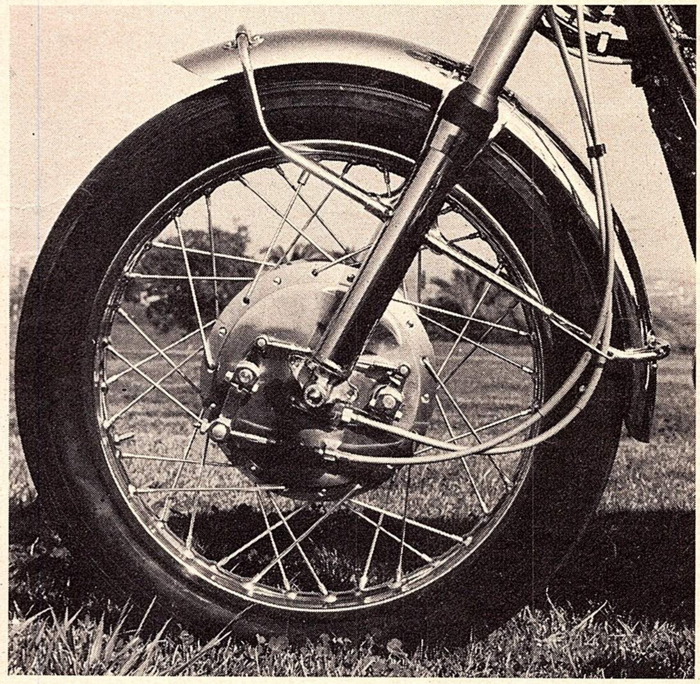
Unlike the earlier X-6, the T-250's clutch took repeated slipping at the drag strip without a whimper, and didn't require adjustment during the entire test. The drive is always taken up smoothly without grabbing, and a cushion-drive mechanism between the rear sprocket and wheel adds more smoothness and extended chain and drive train component life. Primary drive is by helical gear, and is virtually silent in operation. We feel that the very slight power loss incurred by using helical-cut gears is well worth the silence that you wouldn't have if straight-cut gears had been used.

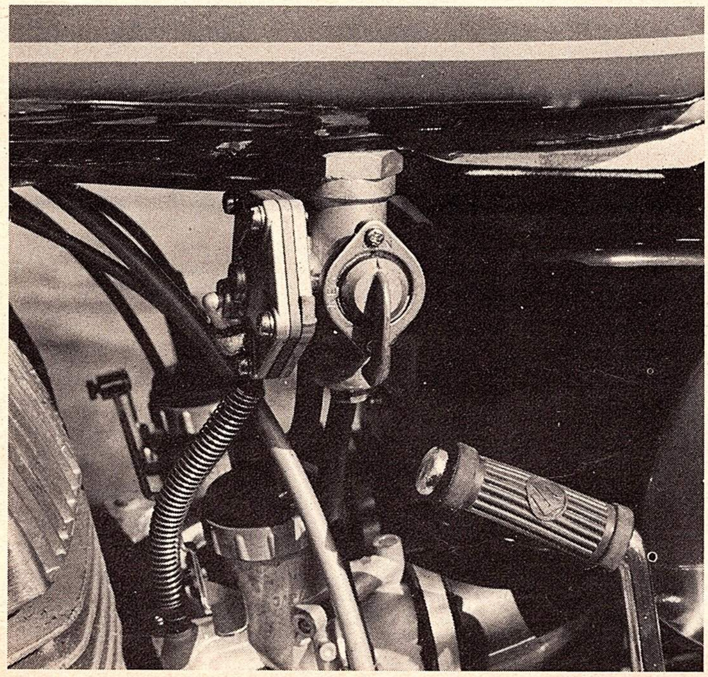
Large, virtually fade-free brakes are employed on the T-250R which complement the motorcycle's outstanding performance. Even after several panic stops from 60 mph during our braking tests, they continued to drag the bike down from speed with good control and efficiency. Lever pressure is nominally low, giving the rider good "feel."

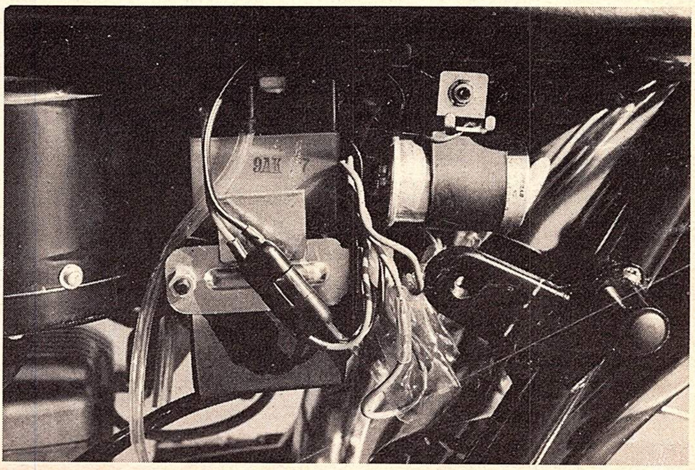
Controls are free in operation and well placed. Brake and clutch levers fall readily to hand, and all thumb operated switches such as the turn signals, high and low beam switch, and the horn are operable without removing the hand from the handlebars. The footpegs are placed fairly high up, which adds a feeling of raciness to the machine (rather like riding a horse with an English saddle), but they weren't so high as to cause cramps for our six-footer. The foot controls are well placed in

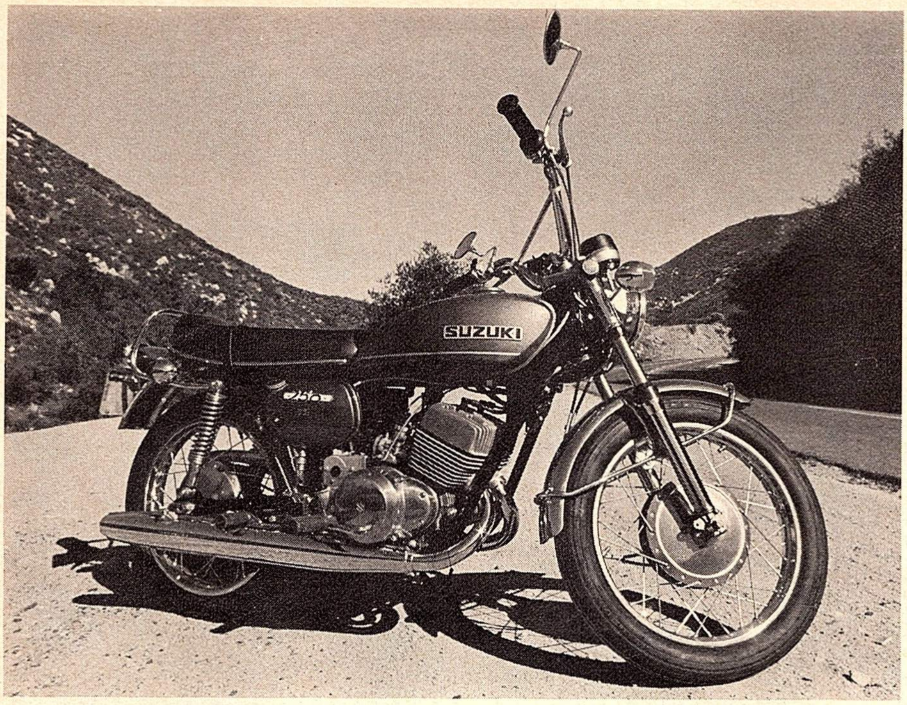

SUZUKI
250











relation to the footpegs, and the seat is reasonably comfortable for solo riding. Things get a little cramped with two aboard.

The handlebars are fairly high and wide, and give good control, but they force the rider to sit in a rather upright position, making him feel like a sail when traveling down the highway at a good clip. Also superfluous is the motocross-style crossbar; it isn't needed, and hardly helps the appearance of the machine.

In their effort to give the T-250R a comfortable ride, Suzuki has gone to too soft a spring rate for the front forks. They settle fairly far down when a rider of average weight climbs aboard, and are downright close to bottoming out with two astride. We'd like to see somewhat stronger fork springs and heavier dampening qualities. The owner could improve the dampening by substituting a heavier weight oil in the forks, and by putting spacers on top of the fork springs to increase the spring rate somewhat.

The rear shocks are all too typically Japanese in their operation. That is, they lack sufficient rebound dampening and have a tendency to act like a pogo stick after hitting a bump. The spring rate is good, and provisions are made for gaining two harder settings by twisting a cam ring at the base of each shock absorber unit.

Despite a fairly short 51.8-in. wheelbase, handling qualities at speed are very good. On smooth roads, the machine can be hustled into a corner at a high rate of speed under complete control, until a bump causes the rear end to hop. Even though ground clearance is quite good with the machine unladen, with the soft suspension partially compressed, and the footpegs and stands nearer the ground, hanging the stands up can be a problem. The short wheelbase and well thought out steering geometry make the T-250R a sheer joy to ride in traffic. It's as nimble a 250 as we've ridden.

Just as important as the steering geometry, the frame must be sturdy and correctly designed. Sturdy it is. Twin downtubes are welded to the steering head and feature thick gussets in this critical area. The tubes continued down under the engine and eventually terminate at points just in front of the top rear suspension mounts. From the top of the steering head rearwards come three tubes, a fairly large central tube and two smaller diameter tubes, one on either side. This design looks a little like the famed Norton Manx Featherbed frame, and is undoubtedly very strong. The swinging arm tubes also appear very strong and immune to flexing.

Suzuki's attention to detail is a strong point. Welds are nearly perfect, alloy castings are smooth and polished to a high luster, and thick chrome plating adds to the overall good appearance. Flawless paintwork on our test machine brought approving remarks wherever we went.

Nice touches abound everywhere. One is the vacuum-operated fuel shut-off valve which automatically closes when the engine is shut off. A reserve position is included, as is a prime position, which allows fuel to flow into the carburetors without the engine running. A sediment bowl may be removed for cleaning periodically. Also appreciated was the inclusion of a grease fitting at the kickstarter pivot point. A better than average toolkit is located under the left-hand side panel, the removal of which exposes the battery and many of the electrics for servicing.

Mention should also be made of the electrical system, which performed exactly as it should; good lights, horn and easy starting were always available. Not so appreciated were the tires, which were quite hard in composition and didn't provide the best grip we've seen in the wet.

Summing up, the T-250R is an excellent machine for the novice and expert alike. It will maintain a comfortable freeway cruising speed, losing its punch only above 70 mph, where adroit use of fifth and sixth gears is necessary. It will even serve admirably for two-up riding, although extended high speed cruising and grade climbing may prove a bit tedious for those used to the torque of a large displacement machine. Our pillion passengers rated the seating as quite comfortable with minimal cramping and good peg position for leg support.

The lightweight 250 is commonly regarded as an interim machine, a good substitute while you accumulate the cash and know-how to go on to bigger things. In this case, some of you may acquire the Suzuki T-250R and never go farther, finding it more than adequate to enjoy most of the pleasures in motorcycling.

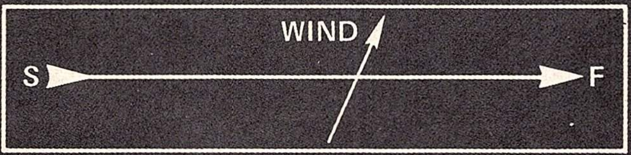
SUZUKI T-250R

SPECIFICATIONS

List price	$699
Suspension, front	telescopic fork
Suspension, rear	swinging arm
Tire, front	3.00-18
Tire, rear	3.25-18
Brake, front, diameter x width, in.	7.08 x 1.1
Brake, rear, diameter x width, in.	7.08 x 1.1
Total brake swept area, sq. in.	48.9
Brake loading, lb./sq. in.	9.2
Engine, type	two-stroke Twin
Bore x stroke, in., mm	2.13 x 2.13, 54 x 54
Piston displacement, cu. in., cc	15, 247
Compression ratio	7.4:1 (corrected)
Claimed bhp @ rpm, lb.-ft.	23.4 @ 7000
Carburetion	(2) VM 26 Mikuni
Ignition	battery and coil
Oil system	oil injection
Oil capacity, pt.	3.8
Fuel capacity, U.S. gal.	3.2
Recommended fuel	premium
Starting system	kick, folding crank
Lighting system	AC, 12-V battery
Air filtration	dry paper
Clutch	multi-disc, wet
Primary drive	gear (3.05)
Final drive	single-row chain (2.93)
Gear ratios, overall:1	
6th	6.34
5th	6.96
4th	8.03
3rd	10.35
2nd	13.39
1st	20.80
Wheelbase, in.	51
Seat height, in.	31
Seat width, in.	10.5
Handlebar width, in.	31
Footpeg height, in.	11.8
Ground clearance, in.	6.6
Curb weight (w/half-tank fuel), lb.	322
Weight bias, front/rear, percent	44.5/55.5
Test weight (fuel and rider), lb.	452

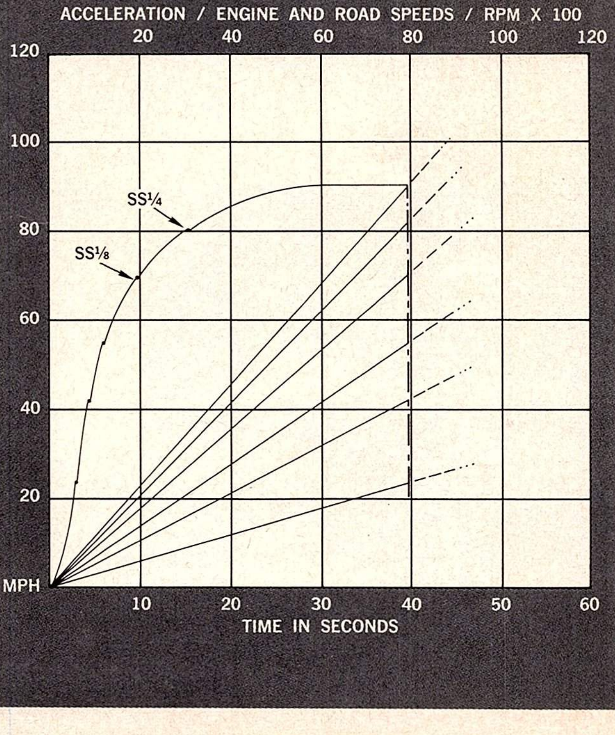
TEST CONDITIONS

Air temperature, degrees F	66
Humidity, percent	49
Barometric pressure, in. hg.	30.28
Altitude above mean sea level, ft.	50
Wind velocity, mph	12-15
Strip alignment, relative wind:	

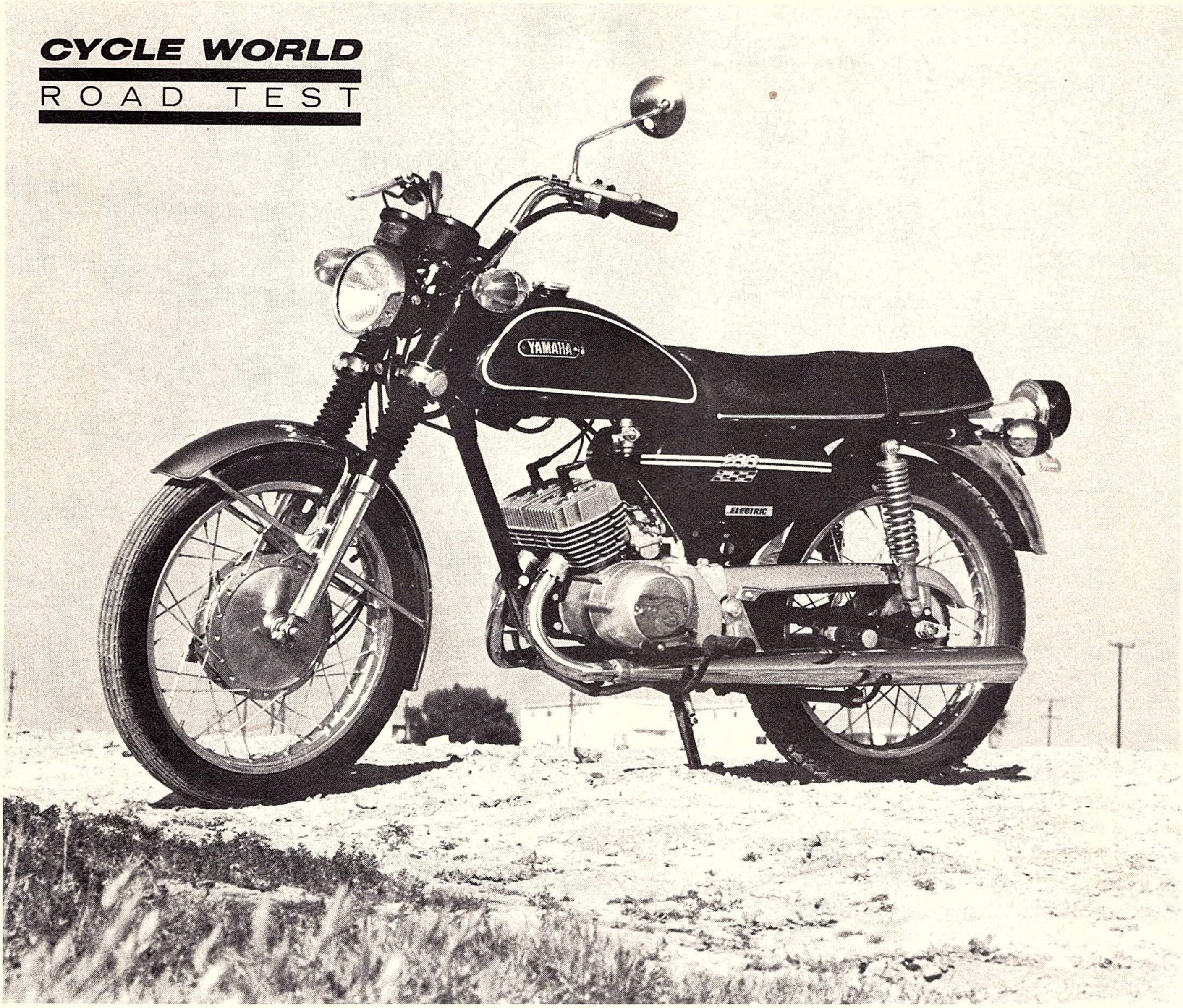


PERFORMANCE

Top speed (actual @ 8020 rpm), mph	90.6
Computed top speed in gears (@ 8000 rpm), mph:	
6th	90.3
5th	82.5
4th	71.4
3rd	55.2
2nd	42.7
1st	23.7
Mph/1000 rpm, top gear	11.3
Engine revolutions/mile, top gear	5308
Piston speed (@ 8000 rpm), ft./min.	2840
Lb./hp (test wt.)	14.6
Fuel consumption, mpg	42
Speedometer error:	
50 mph indicated, actually	47.1
60 mph indicated, actually	55.7
70 mph indicated, actually	63.9
Braking distance:	
from 30 mph, ft.	35
from 60 mph, ft.	144
Acceleration, zero to:	
30 mph, sec.	3.3
40 mph, sec.	4.1
50 mph, sec.	5.1
60 mph, sec.	6.9
70 mph, sec.	9.7
80 mph, sec.	15.6
90 mph, sec.	27.0
Standing one-eighth mile, sec.	9.58
terminal speed, mph	69.0
Standing one-quarter mile, sec.	15.68
terminal speed, mph	80.57

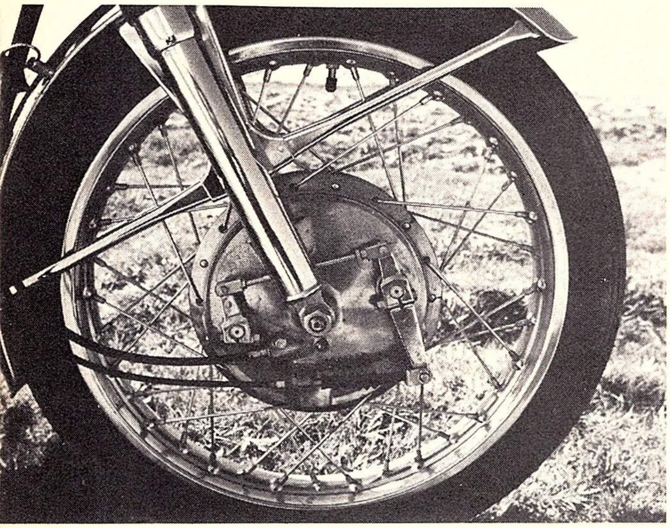


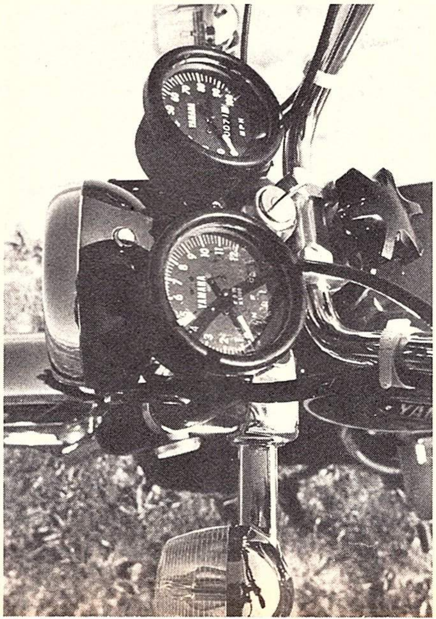
CYCLE WORLD
ROAD TEST

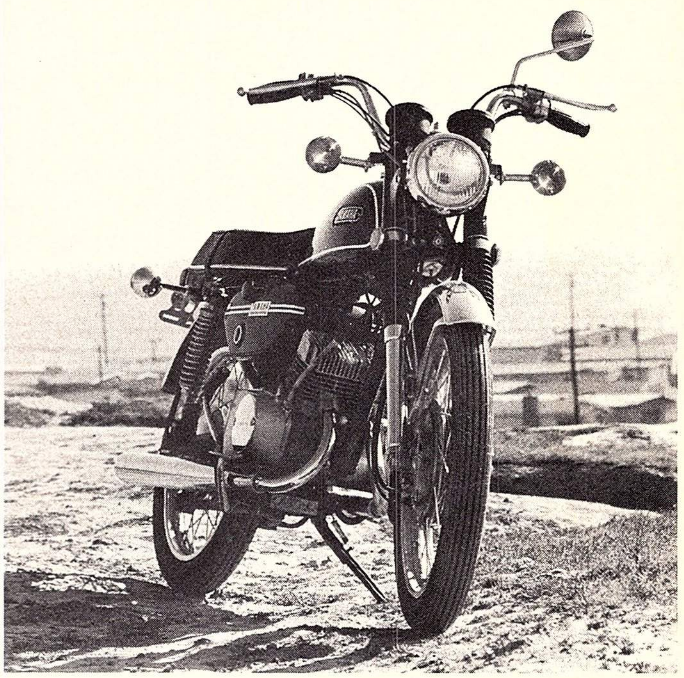


YAMAHA 200 CS3B

The "Almost 250." A Quick, Responsive Handler.







ENGINE DISPLACEMENT is a relative thing. Ideally, a powerplant should be large enough to do the job at hand, but no larger. It is a practical theory, but in reality, most bikes fall into certain classic displacement categories–125, 175, 250, 500, etc.

So what's the reasoning behind Yamaha's 200 CS3B, the "almost 250?" Well, it is the most recent update of another in-between displacement machine, the 180-cc CS1 which was introduced in 1967. The new version is 195cc. More displacement and more punch with minimal change in engine design, that's why the unusual size. And Yamaha's 200, which offers the added convenience of electric starting, is a very pleasant mount.

The engine runs well in the upper limits of its rpm range, and chassis components are more than up to the task of tackling curves on mountain roads at speeds. On level straight sections, the Yamaha 200 will run along at 8500 rpm in fifth cog (approximately 75 mph). Approach a right-hand curve, grab the brakes hard, downshift to fourth, and get back on the gas. At 7000 rpm, shift back into fifth and begin thinking about that next curve, a sharp left. Although handling is quite good, it is a bit quick due to a short, 49-in. wheelbase. Care, in fact, must be taken to avoid wheelies when accelerating hard in the first two gears. A 2.75-18 tire is fitted in front. The rear is a 3.00-18.

Forks are external spring, oil dampened units and the rear shock absorbers, featuring chrome springs, are three-way adjustable. A steering damper is also present that can be adjusted by rotating a large knurled knob located on top of the steering head.

The frame consists of a single toptube that curves downward just behind the engine. At this point, it is welded to plates that provide the rear engine mount and support the footpegs. A single front tube passes from the steering head down to the front of the engine. Tabs welded to this front tube form the forward engine mount.

The engine is used as a structural member and no tubing passes under it. The subframe, which supports the rear fender and seat, consists of two parallel tubes welded to the single toptube just at the rear of the gas tank. This subframe assembly is braced by an additional set of parallel tubes that pass from the rear engine mount to a point just in front of the rear shock absorbers. The rear shocks are mounted to tabs welded to this structure.

Back to those wheelies. Just because the 195-cc twin-cylinder, piston-port two-stroke is small, don't underestimate its performance. Bore and stroke of each cylinder is 52 by 46mm. A claimed 22 bhp is produced at 7500 rpm and maximum torque is 15.7 lb.-ft. at 7000 rpm. Power is transmitted through a wet, multi-plate clutch to a five-speed, constant mesh transmission.

A four-main-bearing, 180-degree crankshaft is used. Needle bearings are fitted at the top and roller bearings at the bottom of each rod assembly. A center seal divides the two crankcase halves. Cylinders are five-ported. The fourth and fifth ports, which perform a booster function, are of the "tunnel" variety and are cast into the cylinders. Two 20-mm Mikuni carburetors deliver the fuel.

As with most small displacement Twins, the machine is a slightly reluctant starter from a dead stop without some clutch slipping, expecially with two aboard. Useable power begins at 3000 rpm and the unit pulls strongly from 5000 rpm right up to its 8200 rpm indicated redline. Because it has to be kept at a fairly high rpm most of the time, the noise level is higher than on some larger machines. You can feel engine vibration in the footpegs, but it is not too objectionable.

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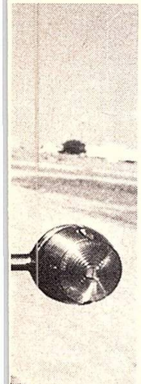
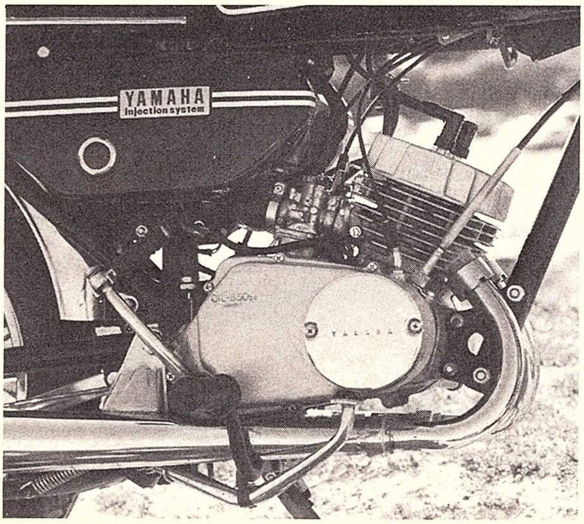
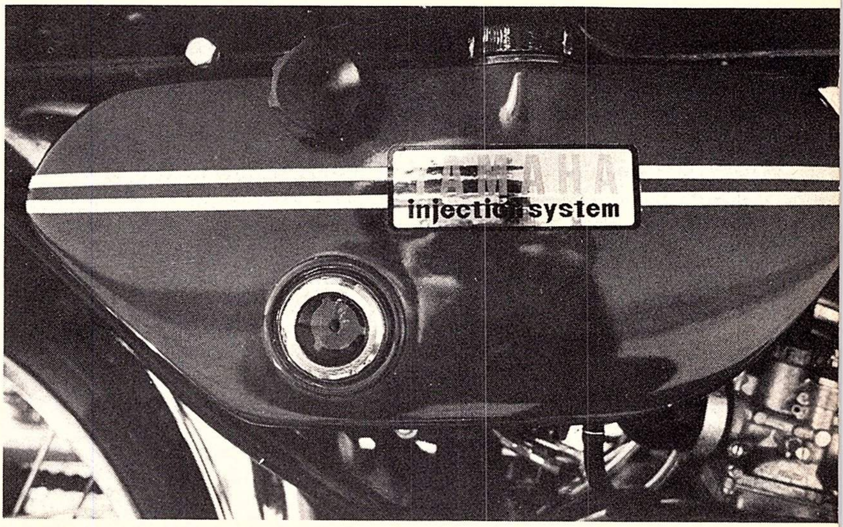
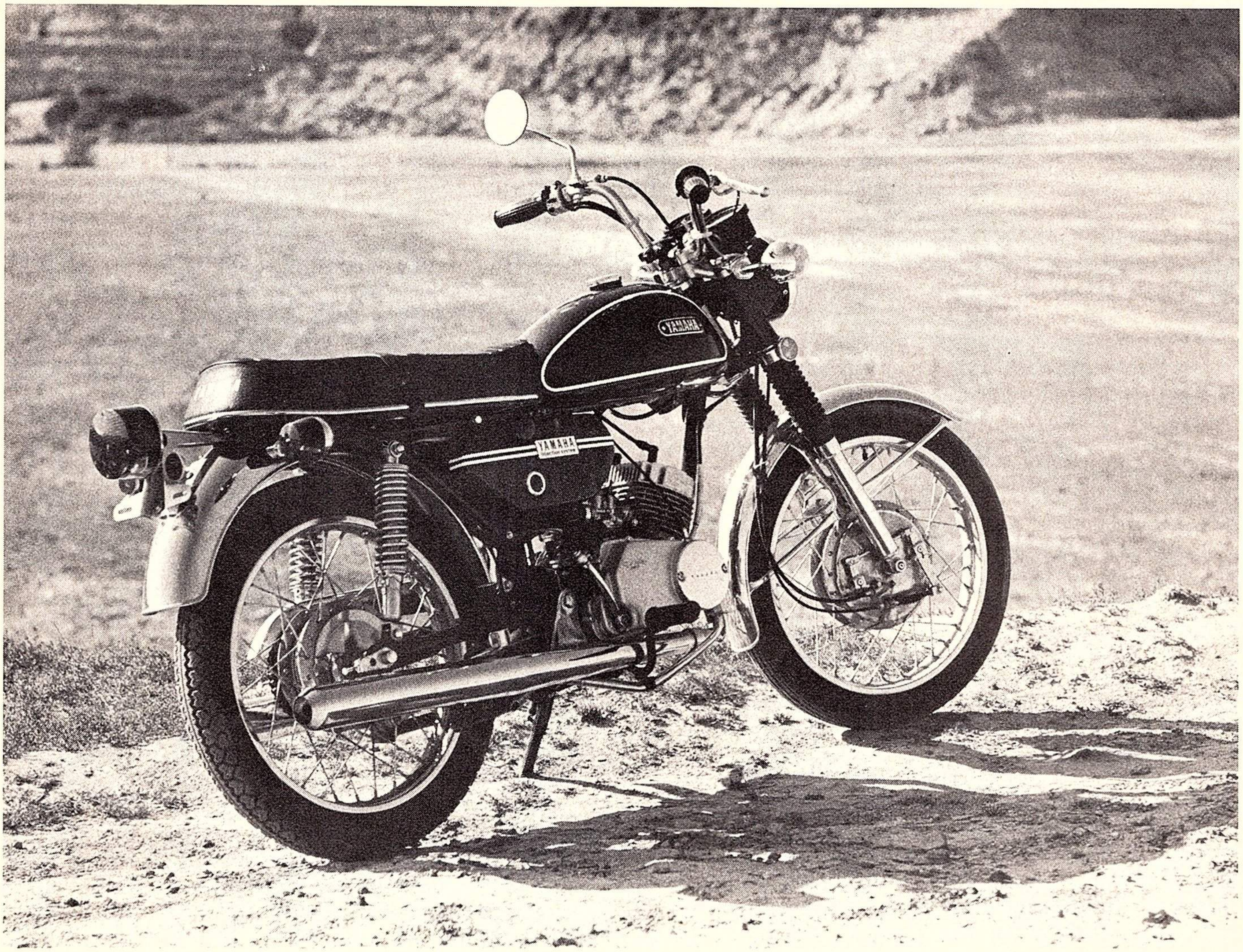








Brakes are smooth and do not grab. Pedal and lever pressure is light. Straight-line stops are the rule, and little fade is encountered after repeated abuse.

As on other Yamahas, Autolube is featured. Gas/oil mixing is automatic. All the rider need do is keep the separate oil tank full. At idle, the gas/oil ratio is approximately 120-150:1. As the throttle is opened and rpm increases, more oil is added. At full throttle, depending on the rpm, the gas/oil ratio will change to approximately 16:1. Less chance of fouling spark plugs and less exhaust smoke are two of the more obvious advantages.

The oil tank is located on the right side of the machine. Its filler cap is partially covered by the seat, but unlike other Yamahas, the tank itself, instead of the seat, is hinged to provide access. Oil capacity is 2.0 quarts. A metal cover, on the opposite side of the Yamaha 200, conceals the toolbox, 12V battery, and a cylindrical air cleaner canister. Two dry paper air filter elements are fitted, one in each end of the canister.

Both a speedometer and a tachometer are provided. They are attractive, easily read, and rubber mounted. Instrument lights, however, are too bright and are annoying when the machine is ridden at night. The speedometer scale goes to 100 mph, but does not feature a resettable trip odometer. The tachometer is sluggish, especially when successive rapid shifts are executed near redline in the lower gears. The indicator lights include a green neutral indicator light on the far left, an amber turn signal indicator light in the center, and a red generator light at the far right.

The ignition switch, conveniently located between the instruments, is also rubber mounted. A fork lock, located between the fork legs just under the headlight, is present. However, no protective cover is provided to keep out dirt.

Turn signals are standard equipment, and their controls are located in the left handgrip housing, as are switches for the horn and high/low, on/off lighting switches.

The handlebar/seat/footpeg relationship is excellent for riding around town, but slightly lower bars would improve rider comfort at freeway speeds. Handlebar width is narrower than that on the average road machine designed for the American market, but this is advantageous as it helps to keep the arms out of the air stream. Air currents flailing against widely spread arms can cause the front end of the bike to jiggle at high speeds.

Overall finish and appearance is quite good. The 2.4-gal. gas tank, side panels and headlight are painted purple. White pinstriping accents the tank and side panels. Fenders are chrome plated, fork legs are highly polished, and the deeply padded seat is black.

With an operating range of slightly over 100 miles, and because it is turning a little over 7000 rpm at freeway speeds, the Yamaha 200 is not an ideal high speed tourer. But then it wasn't intended to be. It's quick, responsive, and fills both a price ($619) and a displacement gap.

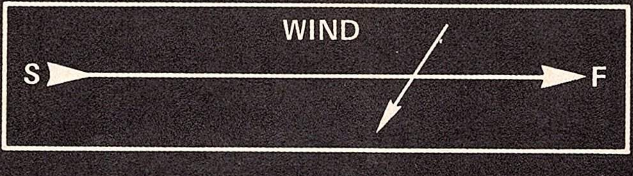
YAMAHA 200 CS3B

SPECIFICATIONS

List price	$619
Suspension, front	telescopic fork
Suspension, rear	swinging arm
Tire, front	2.75-18
Tire, rear	3.00-18
Brake, front, diameter x width, in.	7.08 x 1.18
Brake, rear, diameter x width, in.	5.90 x .98
Total brake swept area, sq. in.	44.40
Brake loading, lb./sq. in.	8.88
Engine, type	two-stroke Twin
Bore x stroke, in., mm	2.04 x 1.81, 52 x 46
Piston displacement, cu. in., cc	195
Compression ratio	7.1:1
Claimed bhp @ rpm	22 @ 7500
Claimed torque @ rpm, lb.-ft.	15.7 @ 7000
Carburetion	(2) 20-mm Mikuni
Ignition	battery and coil
Oil system	oil injection
Oil capacity, pt.	4.0
Fuel capacity, U.S. gal.	2.4
Recommended fuel	regular
Starting system	electric, kick
Lighting system	12-V alternator
Air filtration	dry paper
Clutch	multi-plate, wet
Primary drive	helical gear
Final drive	chain
Gear ratios, overall:1	
5th	7.96
4th	9.90
3rd	13.46
2nd	17.77
1st	26.84
Wheelbase, in.	49
Seat height, in.	30.5
Seat width, in.	10.5
Handlebar width, in.	27.5
Footpeg height, in.	10.0
Ground clearance, in.	6.5 (at stand)
Curb weight (w/half-tank fuel), lb.	264
Weight bias, front/rear, percent	44/56
Test weight (fuel and rider), lb.	394

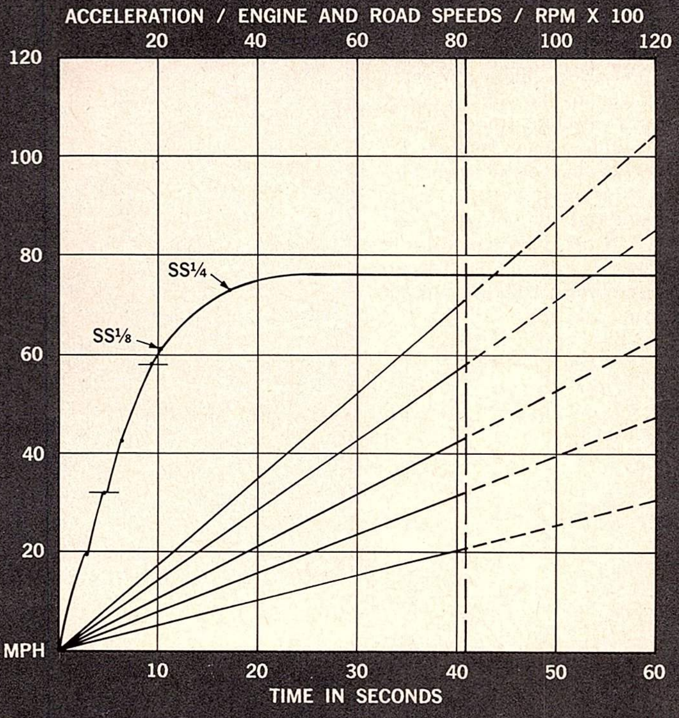
TEST CONDITIONS

Air temperature, degrees F	68
Humidity, percent	45
Barometric pressure, in. hg.	30.31
Altitude above mean sea level, ft.	50
Wind velocity, mph	3-6
Strip alignment, relative wind:	



PERFORMANCE

Top speed (actual @ 8680 rpm), mph	76.33
Computed top speed in gears (@ 8200 rpm), mph:	
5th	72
4th	58
3rd	43
2nd	32
1st	21
Mph/1000 rpm, top gear	8.8
Engine revolutions/mile, top gear	6840
Piston speed (@ 8200 rpm), ft./min.	2470
Lb./hp (test wt.)	17.9
Speedometer error:	
50 mph indicated, actually	46.7
60 mph indicated, actually	56.6
70 mph indicated, actually	66.2
Braking distance:	
from 30 mph, ft.	34.1
from 60 mph, ft.	142.0
Acceleration, zero to:	
30 mph, sec.	4.2
40 mph, sec.	5.9
50 mph, sec.	7.7
60 mph, sec.	10.0
70 mph, sec.	14.7
Standing one-eighth mile, sec.	10.34
terminal speed, mph	61.30
Standing one-quarter mile, sec.	17.05
terminal speed, mph	72.99



THE 200 MILER:

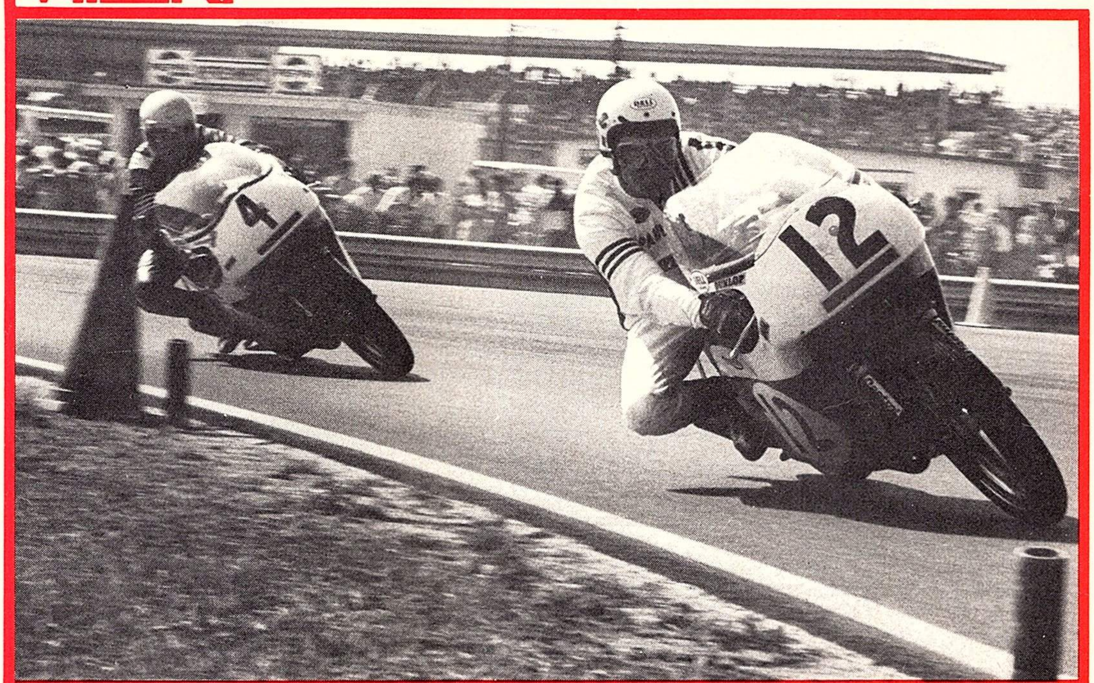
"A FANTASTIC SCHOOL OF ROAD RACING."

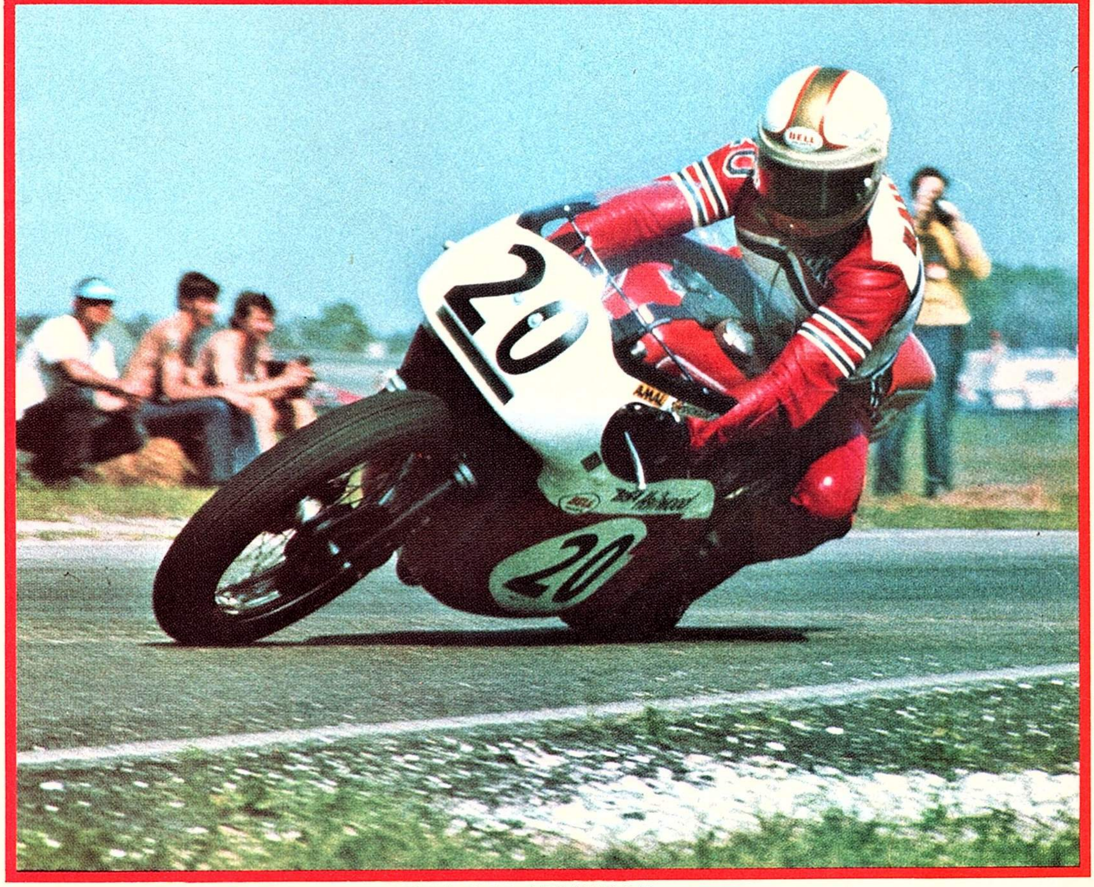
He did it last year on a Honda. He did it this year on a BSA. And both times, Dick Mann's strategy was the same. Hang in there and wait for the jackrabbits to break. Which they did.

First came the opening two-lap chase after Cal Rayborn's quick accelerating factory Harley, which ended as his gearbox failed. Next leader was Gary Fisher, riding a rapid "Pop Yoshimura" kitted 750 Honda. It soon expired with a broken cam chain. Then it was Paul Smart's turn. The knee-out Englishman (12) pushed his Triumph 750 Three in front, tailed by the fabled Mike Hailwood (20), on the factory BSA. Hailwood, the former 9-times world champion, nudged in front several times, was repassed, and finally lost the chase on Lap 15 when a valve train failure put his Three onto two.

Smart led for 40 laps, Mann following a scant few feet back. Then a tell-tale trail of smoke issued from Smart's Triumph. Mann may have seen it, for he slowed, possibly thinking that his own machine, similar to Smart's, might fail if he pressed on at the English scratcher's pace.

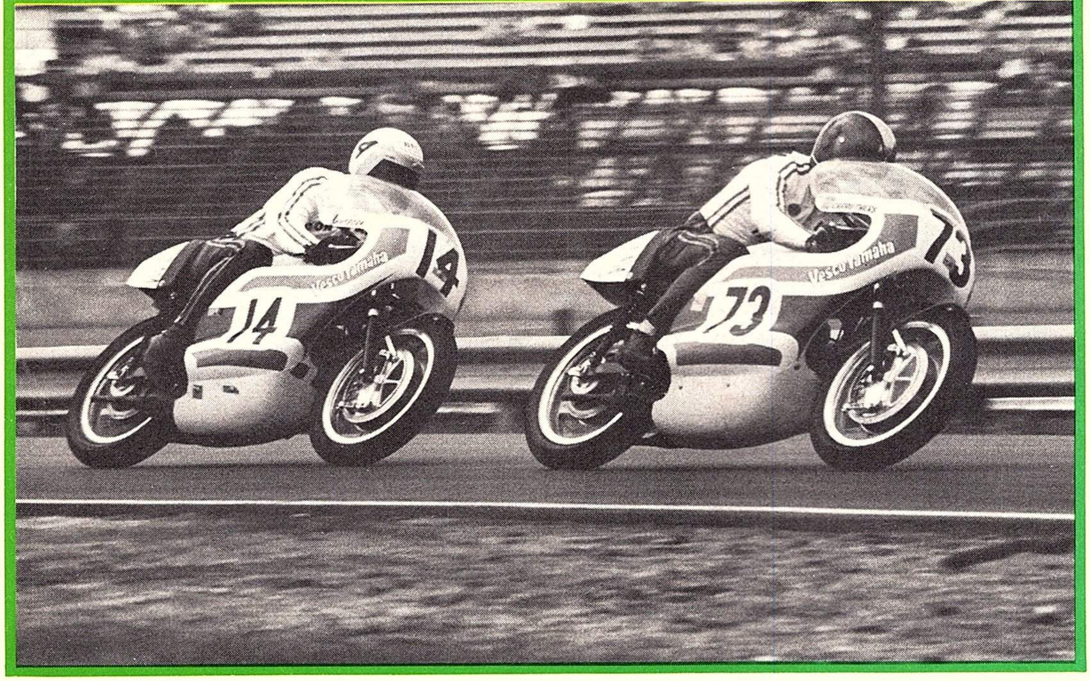
Smart pulled out on Lap 41, as oil getting by his Triple's piston rings fouled the plugs. He reentered after a change to hotter plugs, but only tentatively. Mann continued on to win. In the victory circle, nursing a sore foot from an altercation with a pylon on Lap 27, the 37-year-old do-all champion said of his overseas opponents: "It was a fantastic school of road racing." Mann's average for the distance was 104.737 mph, beating his record of 102.696 mph set last year.





PHOTOS BY JOSEPH C. PARKHURST & BOB ATKINSON

250cc EXPERT/JUNIOR:



THE KEL AND CAL SHOW

They went wheel to wheel like this for most of 27 laps, Kel (73) and Cal (14). Tuner Don Vesco swears that both machines were equal in power output. But 1969 world champion Kel Carruthers weighs about 25 lb. less than Cal Rayborn, and therefore could "hang more gear" on his Yamaha. Rayborn passed Kel several times in the infield, but Kel could always get back in front on the fast oval. Cal stayed with Kel by drafting, nervously noting that the extra speed gained from Kel's draft caused him to overrev by 300 rpm. Carruthers finally evaded Rayborn for good, when they slipped free of traffic late in the race.

750cc JUNIOR:

A KITTED HONDA WINS

Floridian Dennis Poneleit's (28) race-kitted Honda 750 Four wasn't the fastest bike in the Junior 100-miler. Mike Lane's 500-cc Kawasaki H1R was. But Lane lost his early 33-sec. lead due to pit stops for partial seizure and a broken shift lever. Dave Burchard, on another kitted Four, took over the lead briefly, and then Poneleit inherited the win as Burchard's machine expired.

250cc NOVICE:

"I POLISH IT A LOT."

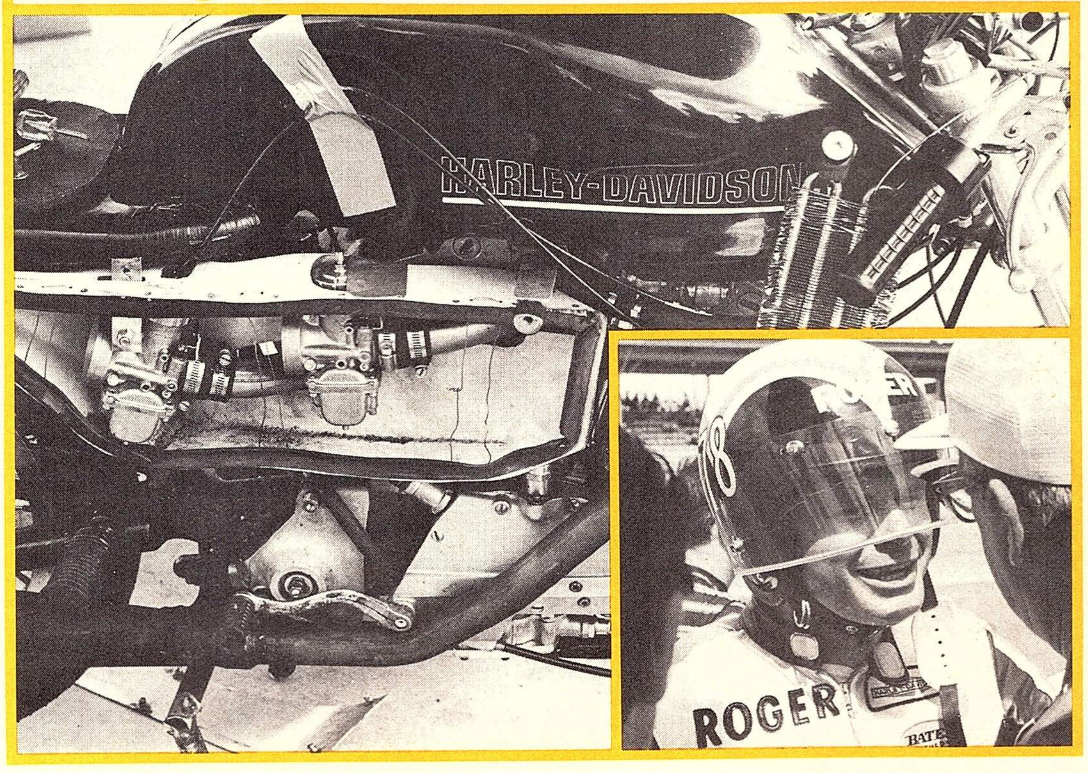
Fact: 36 of the first 40 machines in the Novice 250 race were Yamahas. Winner Howard Lynggard's bike was a Yamaha. But Lynggard's jocular tuner, Al Goden, must know something that Yamaha International doesn't. The crankshaft of the TD2 he prepared for Lynggard had 12 races on it, and Yamaha thinks it should only go three races. Goden conceded that in preparation for Daytona, he installed new pistons "because I thought the bike deserved it." For the next AMA national, Goden will give the TD2 only its standard preparation: "I polish it, yes, I must admit that I polish it a lot." And Lynggard flys it. After running off the road early in the event, he repassed three-quarters of the field and slipped into the lead seconds before getting the checkered flag.

BSA&TRIUMPH

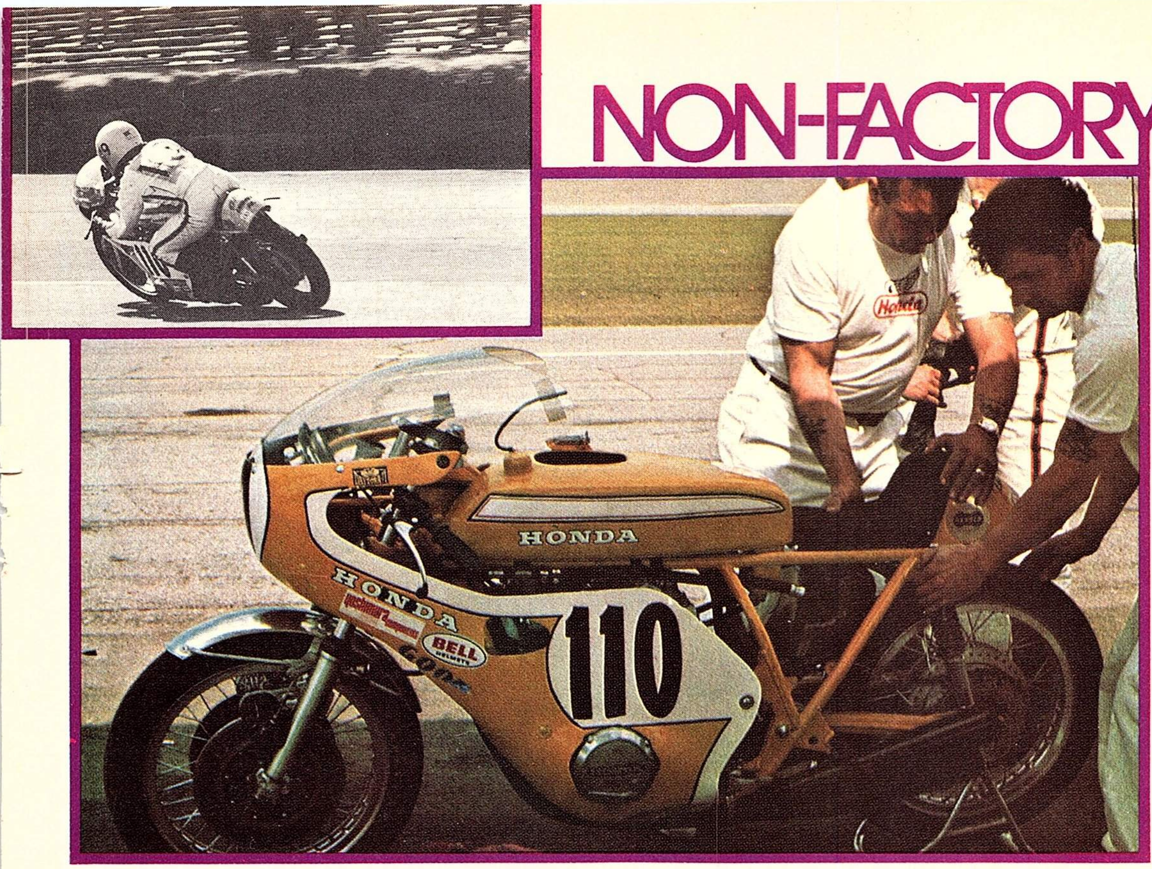
In practice, the Threes ran well all week. Main problem: caliper mounting point for the double-disc front brakes... Divided opinion, with Triumph's Doug Hele supporting the theory that differential stress on forks is less with calipers behind stanchions. Mann, Smart & Hailwood went Hele's route. Triumph's favorite, Gary Nixon, had his broken leg pinned, rode, but off the pace. Smart's Triumph was fastest qualifier on the racing circuit at 105.800 mph, with straightaway trap speeds around 155 mph. It was the only Three using Amal concentrics; the rest were using the old, trusty GP carburetors. Don Emde's BSA was 4th qualifier, Hailwood's 5th, Jim Rice's 10th, Mann's 11th, Romero's Triumph, 13th. In the race, Triumph had two bikes in the top 10: Romero, steadily moving from 5th to 2nd; Tom Rockwood in 9th. BSA's second machine in the top 10 was that of Don Emde, who succeeded in a late bid for 3rd place.

HARLEY-DAVIDSON

The XR750s were surprising. Cal Rayborn and Mark Brelsford qualified 2nd and 3rd fastest at 105.678 mph and 105.613 mph. They must have been doing it in the infield because they were running only 146-148 mph through the speed traps. Acceleration, if not top speed, had been greatly improved by using 36mm-bored-to-37mm Mikuni carburetors. Rayborn commented: "Power right now... instant torque... smooth!" The bikes are heavy (340 lb.), but low c.g. gave Cal the handling edge in the infield. A rare gearbox failure, the selector mechanism, denied Cal his chance at a win, and he was pitted for 28 minutes during the race. Brelsford's blew up early. Mert Lawwill suffered a flat tire, crashed and fractured an elbow. And Roger Reiman, on an XR he built himself, finished 4th in the 200, although he had only qualified in 27th spot.



THE BIG RACE: HOW T



NON-FACTORY HONDA

Everyone may think that Paul Smart's bike was the fastest. Not so. The fastest, a dark horse, was Gary Fisher's Honda 750 Four, which led the 200 for a few laps before destroying the cam drive chain. The engine was provided by Japanese super-tuner "Pop" Yoshimura, and slipped into the Honda racing-kitted frame with double-disc front brake. This bomb had a short fuse, and pumped oil like a tanker, but it was fast. Fisher, the former protege of Gary Nixon, started off his first year as Expert by qualifying 6th fastest at 105.039 mph. Rumors have it that more of these engines, with stronger cam chains, will be in the country soon.

KAWASAKI

Walt Fulton (17), qualifying 8th fastest at 104.674 mph, had the fastest 500-cc H1R three-cylinder. Those of Texan Rusty Bradley, who cleaned up in Amateur competition last year, Ralph White, and Yvon DuHamel were also in the top 20 qualifying slots to determine starting grid position. But the bikes were struck with full or partial seizures, and DuHamel lost a full minute on the field with a reluctantly starting machine. Bradley, an extremely hot prospect, suffered fatal head injuries in a high speed crash at Turn 1; the racing fraternity will greatly miss this young college student/road racer, always personable, cheerful and a credit to the game.

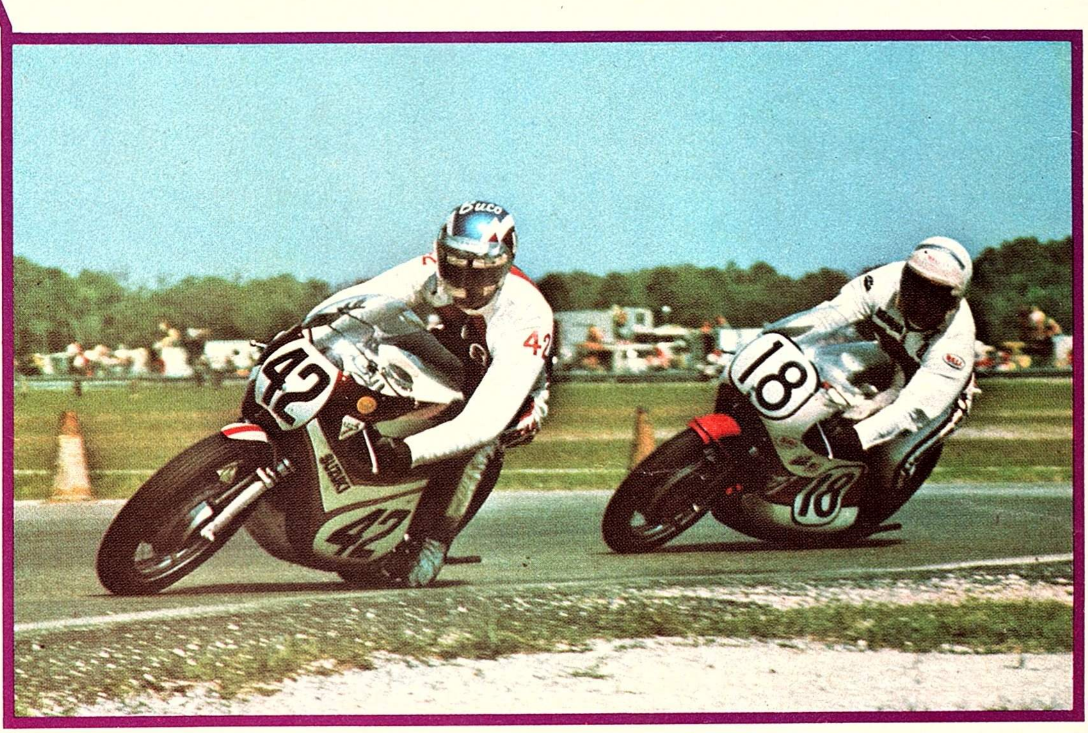
HE FACTORIES FARED

SUZUKI

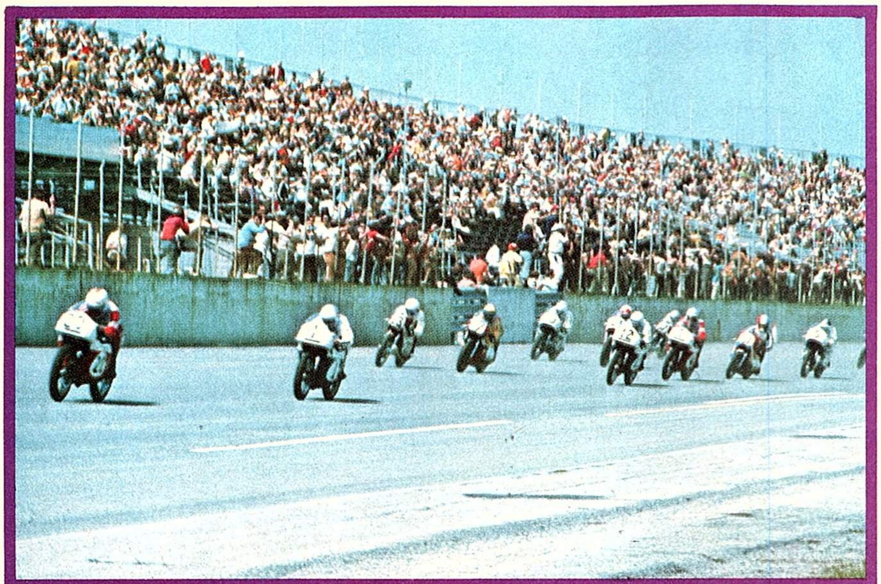
Suzuki had their worst year ever. The lighter, lower new 500-cc Twins were slower than last year's. The engines, fitted with a new CDI ignition identical to that on the championship motocross machines, started easy, but gave false spark plug readings. Result: continued seizures, rich-feeling carburetion, yet melted pistons. The bikes were down on rpm. Jody Nicholas' machine (23) qualified the fastest in 9th spot at 104.534 mph. Ron Pierce's Suzuki went the farthest in the race—27 laps. Suzuki's only consolation was Miss Suzuki. Their taste was impeccable.

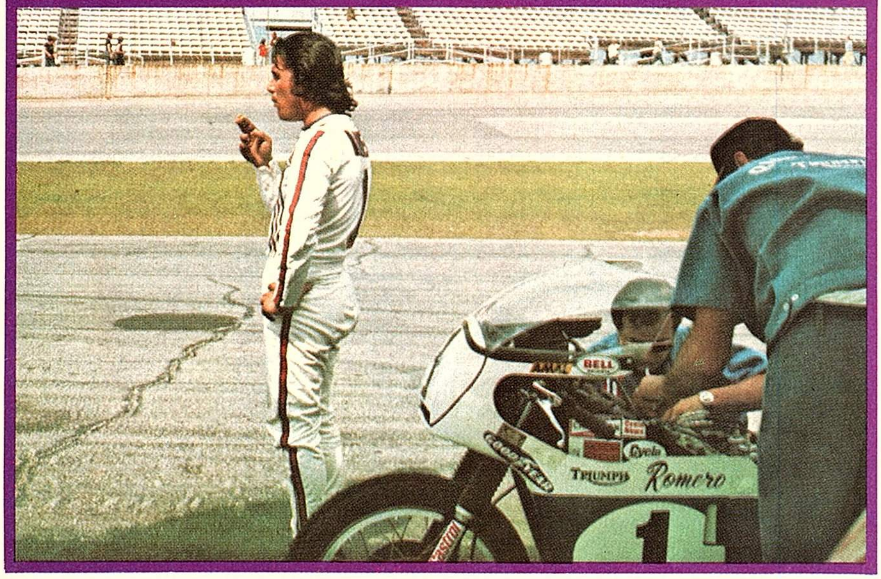
YAMAHA

The undersized 350-cc Yamaha Twins were basically a concerted show of private and dealer sponsored machines. The Vesco-tuned machine for Aussie Kel Carruthers qualified quite well—7th fastest at 104.678 mph—most of this speed being in the infield. During the 200, Kel's bike began pumping oil from the transmission breather pipe, and he had to pit for a replacement, dropping back from an early 5th place position. But he made up time after the stop and finished 10th. Best Yamaha finisher was Jimmy Odom (18) in 5th spot, shown here running with Suzuki's Ron Grant (42).



HOW THEY FARED CONT.





THE STATISTICS

200-MILE NATIONAL

1.	Dick Mann, Richmond, Calif.	BSA	53
2.	Gene Romero, San Luis Obispo, Calif.	Tri	53
3.	Don Emde, San Diego, Calif.	BSA	53
4.	Roger Reiman, Kewanee, Ill.	H-D	52
5.	Jim Odom, Fremont, Calif.	Yam	52
6.	Chuck Palmgren, Freehold, N.J.	Yam	51
7.	Jess Thomas, Seacliff, N.Y.	Tri	51
8.	Tom Rockwood, Gardena, Calif.	Tri	51
9.	Dave Smith, Lakewood, Calif.	Kawa	50
10.	Kel Carruthers, Sidney, Australia	Yam	50
11.	Frank Camillieri, Chelsea, Mass.	Yam	50
12.	Martin Carney, London, England	Yam	50
13.	James Dunn, Everett, Wash.	Yam	50
14.	Fred Gunter, Detroit, Mich.	Yam	50
15.	Cliff Carr, Watertown, Mass.	Kawa	50
16.	Don Castro, Hollister, Calif.	Tri	49
17.	Bill Manley, Long Beach, Calif.	BSA	49
18.	Dave Aldana, Santa Ana, Calif.	BSA	49
19.	Rick Deane, Aspen, Colo.	Yam	49
20.	Ron Widman, St. Louis, Mo.	H-D	48
21.	Larry Koup, Oberlin, Pa.	Kawa	48
22.	Ray Hempstead, St. Petersburg, Fla.	Yam	47
23.	Russell Coppage, Chatsworth, Calif.	Yam	47
24.	Mike Sponseller, Phoenix, Md.	Tri	47
25.	Dennis Schoenfeldt, Houston, Texas	Hon	47
26.	Bentley Hardwick, Dallas, Texas	Nor	46
27.	Robert Hindle, Brookville, Ohio	Tri	46
28.	Jeff Sperry, Bakersfield, Calif.	Yam	46
29.	Bob Bulmer, Morrice, Mich.	Yam	45
30.	Don Droud, Lincoln, Neb.	BSA	45

Time of race: 1 hr., 54 min., 55.62 sec.

Average speed: 104.737 mph for a new record. Old record was set in 1970 by Dick Mann on a Honda at 102.697 mph.

JUNIOR 100-MILE

1.	Dennis Poneleit, Sarasota, Fla.	Hon	27
2.	James Allen, Islington, Ont., Can.	Yam	27
3.	John Lysight, Tracy, Que., Can.	Kawa	27
4.	Kurt Liebmann, Bergenfield, N.J.	Hon	27
5.	R.G. Wakefield, Indianapolis, Ind.	Kawa	27
6.	Edward Sturgess, Hamilton, Ont., Can.	Kawa	27
7.	John Ciener, Cocoa Beach, Fla.	Yam	27
8.	David Burchards, Long Beach, Calif.	Hon	26
9.	Johnny Lane, Bakersfield, Calif.	Kawa	26
10.	D.W. Killen, San Diego, Calif.	Kawa	26
11.	Paul Furlong, Allentown, N.J.	Kawa	26
12.	James Zubritsky, Drums, Pa.	Yam	26
13.	James Kersting, No. Judson, Ind.	Kawa	26
14.	Jim Adams, Minneapolis, Minn.	Yam	26
15.	Tom Schroeder, Marshall, Mich.	Yam	26
16.	James Metrando, Poughkeepsie, N.Y.	Yam	26
17.	Albert McAlexander, Memphis, Tenn.	Hon	25
18.	John Nash, New Haven, Conn.	Yam	25
19.	James Cotherman, Freeport, Ill.	Match	25
20.	Thomas Bardeman, Cypress, Calif.	Yam	25

Time of race: 1 hr., 58.27 sec.

Lap leaders: No. 24, laps 1 through 16; No. 45, laps 17 through 23; No. 28, laps 24 through 27.

Race speed was no record. Record was set in 1970 by Rusty Bradley on a Kawasaki at 100.732 mph.

EXPERT-JUNIOR 250cc 100-MILE

1.	Kel Carruthers, El Cajon, Calif.	Yam	27
2.	Cal Rayborn, San Diego, Calif.	Yam	27
3.	Duane McDaniels, Milford, Mich.	Yam	27
4.	Gary Fisher, Parkesburg, Pa.	Yam	27
5.	Steve McLaughlin, Duarte, Calif.	Yam	27
6.	Ray Hempstead, St. Petersburg, Fla.	Yam	27
7.	John Gillwray, Los Angeles, Calif.	Yam	27
8.	Harry Cone, Sherman, Texas	Yam	27
9.	Conrad Urbanowski, Miramar, Fla.	Yam	27
10.	Rusty Bradley, Dallas, Texas	Yam	26
11.	Frank Camillieri, Chelsea, Mass.	Yam	26
12.	Rudy Galindo, Santa Fe Spgs., Calif.	Yam	26
13.	Ken Molyneux, Vancouver, Can.	Yam	26
14.	Jeff March, Elm, N.J.	Yam	26
15.	Ken Roberts, Redwood City, Calif.	Yam	26
16.	Danny Deubler, Sioux Falls, S.D.	Yam	26
17.	George Roche, Downey, Calif.	Yam	26
18.	James Allen, Islington, Ont. Can.	Yam	26
19.	Jim Maness, Augusta, Ga.	Yam	26
20.	Jeff Sperry, Bakersfield, Calif.	Yam	25

Time of race: 1 hr., 06.87 sec.

Average speed: 101.366 mph.

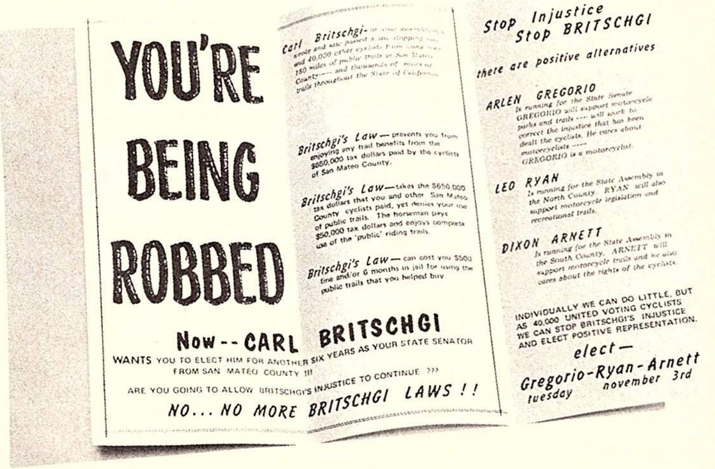
76-MILE NOVICE

1.	Howard Lynggard, Duarte, Calif.	Yam	21
2.	Scott Autrey, Bellflower, Calif.	Yam	21
3.	John Long, Miami Beach, Fla.	Yam	21
4.	Kenneth Adams, Dalton, Ga.	Yam	21
5.	Douglas Teague, Grosse Point, Mich.	Yam	21
6.	Terry Heckart, Roeland Park, Kan.	Yam	21
7.	Robert Rectenwald, Pittsburg, Pa.	Yam	21
8.	Everett Strawn, Biloxi, Miss.	Yam	21
9.	William Vickery, Denver, Colo.	Yam	21
10.	Phil McDonald, Riverside, Calif.	Yam	21
11.	Graham Janes, Florence, Ala.	Yam	21
12.	Joe Cerciello, Staten Island, N.Y.	Yam	20
13.	Frans Vandenbrock, Cypress, Calif.	Yam	20
14.	Peter Baer, Lancaster, Pa.	Yam	20
15.	Larry Bishop, Mansfield, Ohio	Yam	20
16.	James Arnold, Whitby, Ont. Can.	Yam	20
17.	Thomas White, Gardena, Calif.	Yam	20
18.	David Rudolph, Oakdale, Pa.	Yam	20
19.	Edward Hackney, New York, N.Y.	Yam	20
20.	Don Hollingsworth, St. Augustine, Fla.	H-D	19

Time of race: 49 min., 13.27 sec.

Average speed: 95.934 mph.

Voting an "Anti" Out: Case History



YOU'RE BEING ROBBED

Carl Britschgi— [illegible] wrote and [illegible] passed a law stopping [illegible] and 40,000 other cyclists from using [illegible] 150 miles of public trails in San Mateo County— and thousands of miles of trails throughout the State of California

Britschgi's Law— prevents you from enjoying any trail benefits from the $650,000 tax dollars paid by the cyclists of San Mateo County.

Britschgi's Law— takes the $650,000 tax dollars that you and other San Mateo County cyclists paid, yet denies your use of public trails. The horseman pays $50,000 tax dollars and enjoys complete use of the 'public' riding trails.

Britschgi's Law— can cost you $500 fine and/or 6 months in jail for using the public trails that you helped buy

Now -- CARL BRITSCHGI

WANTS YOU TO ELECT HIM FOR ANOTHER SIX YEARS AS YOUR STATE SENATOR FROM SAN MATEO COUNTY !!!

ARE YOU GOING TO ALLOW BRITSCHGI'S INJUSTICE TO CONTINUE ???

NO... NO MORE BRITSCHGI LAWS !!

Stop Injustice
Stop BRITSCHGI

there are positive alternatives

ARLEN GREGORIO Is running for the State Senate. GREGORIO will support motorcycle parks and trails ---- will work to correct the injustice that has been dealt the cyclists. He cares about motorcyclists ---- GREGORIO is a motorcyclist.

LEO RYAN Is running for the State Assembly in the North County. RYAN will also support motorcycle legislation and recreational trails.

DIXON ARNETT Is running for the State Assembly in the South County. ARNETT will support motorcycle trails and he also cares about the rights of the cyclists.

INDIVIDUALLY WE CAN DO LITTLE, BUT AS 40,000 UNITED VOTING CYCLISTS WE CAN STOP BRITSCHGI'S INJUSTICE AND ELECT POSITIVE REPRESENTATION.

elect—
Gregorio-Ryan-Arnett
tuesday november 3rd

Land Closure Got You Down? Got Those Anti-Motorcyclist-Horsemen-Get-All-The-Breaks Blues? Then Check Out The Mistakes And Successes Of This Enterprising Group In San Mateo County. Mustering 25,000 Votes To Bounce An Unsympathetic Politician Out Of Office Is No Easy Trick— But They Did It!

BY BOB ATKINSON

LAND CLOSURE IS no longer a problem that we can put off. It is reality. It is widespread. But, it is not a hopeless battle, as the motorcyclists of San Mateo County have discovered.

ITEM: There are an estimated 40,000 motorcyclists in California's San Mateo County.

ITEM: In the past six years, motorcyclists have actively campaigned to obtain a county riding area, but have succeeded in securing zero miles of trails and facilities for their use.

ITEM: There are approximately 1500 horses in San Mateo County.

ITEM: San Mateo County maintains 115 miles of trails for horsemen. In addition, plans have been approved for an additional 246 miles of horsetrails and 22 rest stops. Total existing and proposed trails equals 361 miles.

ITEM: It is against the law for motorcyclists to use these trails which could cost taxpayers as much as $984,000, but not less than $615,000. The average trail construction cost is $2500 to $4000 per mile for average terrain. Rest stops cost $37,000 each, for a total of $814,000. Minimum grand total—$1,429,000.

Shouldn't county recreational facilities be constructed and maintained to suit the recreational needs of the people on a population per sport basis?

Although several motorcycle park proposals have been turned down, other private or special interest groups' use of public land is not opposed.

ITEM: Of the 18,099 acres of public land under the jurisdiction of the Marin Municipal Water District, 6012 acres are leased to private clubs for recreational purposes. Members of these private clubs participate in varying forms of sport including camping, golfing, and gun club activities. Rent ranges from $350 a year for 850 acres to $625 a year for 500 acres.

ITEM: There are two underpasses which were installed by the State of California and San Mateo County to allow horseback riders and pedestrians to cross under the Junipero Serra Freeway. One is located just north of the Woodside Road and the other is at Walsh Road and the Junipero Serra Freeway (Highway 280). Although these are public facilities that cost taxpayers a total of $60,000, both are inaccessible to the public. One is located on private property and the entrance to the other is blocked by locked gates. Only members of certain horse clubs have keys and/or access privileges.

Obviously, influential people have more than one special interest. And, obviously, one cannot generalize and say that all horsemen are bad, even though this recreational facility problem looks like a horsemen vs. motorcyclists conflict on the surface.

"When we speak of horsemen," says San Mateo County Motorcycle Association spokesman Allen Bygdnes, "we're not talking about all horsemen. An awful lot of them are real decent people. But, a very small minority are extremely wealthy. They operate differently than you and I would operate. They can effectively make large contributions to politicians. But, we (motorcyclists) can offer something that these politicians desperately want, and that's votes!"

14-YEAR INCUMBENT DEFEATED

Arlen Gregorio, a 39-year-old assistant city attorney in San Bruno, a small town on the north end of the county, defeated 14-year incumbent State Assemblyman Carl A. Britschgi in his bid for state senator by 9800 votes.

Britschgi, thought by many to be a shoe-in candidate, had a consistent anti-motorcycle voting record. Much of the credit for his defeat must go to the San Mateo County Motorcycle Association.

Sound incredible? Well it is when you realize that this motorcycle association is run by a group of five individuals elected by representatives of all county motorcycle clubs, county dealers, and all interested motorcyclists.

These five men, aided by those who wished to donate time, mailed and distributed 40,000 political pamphlets to motorcyclists in the county two days before the election. The pamphlet endorsed Gregorio and stated that he was willing to work to correct the injustice dealt cyclists.

As for Britschgi, the pamphlet stated that "as your assemblyman, Carl Britschgi wrote and passed a law stopping you and 40,000 other cyclists from using over 150 miles of public trails in San Mateo County . . . and thousands of miles of trails throughout the State of California."

Naturally, the San Mateo County Motorcycle Association cannot take full credit for the victory. Other groups were involved. But, because an estimated 90 percent of the people vote either Republican or Democrat consistently, and since motorcyclists are credited with providing approximately 25,000 votes for Gregorio, it is obvious that the cyclists' vote was instrumental in swinging this election in favor of a candidate who had never before held public office.

If further proof of the power of organized voting is needed, two other San Mateo County Motorcycle Association-backed candidates, Leo Ryan and Dixon Arnett, gained state assembly seats.

In about a year, three supervisory positions will be open in the county, and you can bet that the motorcyclists will back candidates sympathetic to their cause. With this, their strategy becomes clear.

Richard Bygdnes, San Mateo County Motorcycle Association member, puts it this way, "Right now, it's not politically wise, if you're an elected official, to be on the motorcyclists' side. It is wise to be on the horsemen's or conservationists' side. So we never will, I don't think, make small strides. When we get to the point where we have an equal balance of power, then it will be a cascading effect. We'll really get someplace. But, until it's politically beneficial to help us, we'll get nothing."

RESULTS SANS PUBLIC DONATIONS

What is even more impressive is the fact that they did not ask the public to donate money in the name of securing land. A combination motorcycle race and association picnic was held, with dealer and manufacturer cooperation. It yielded a $1500 profit over all expenses, including the mailing and printing of political pamphlets.

Door prizes were featured, and tickets were sold for two months prior to the activity. Each dealer in the county and two distributors donated money for gift certificates. The grand prize was a $1000 gift certificate, redeemable at any participating dealer. Furthermore, some manufacturers were willing to reduce dealer cost on the machine of the winner's choice, if the winner elected to choose a motorcycle. Thus, the association's profit was increased.

Just as people are reluctant to donate money to unknown groups, only two or three percent will write letters to politicians when requested. People will sign petitions, but politicians don't seem to take either of these methods of expressing public sentiment too seriously. "Politicians," says Richard Bygdnes, "know that motorcyclists are a disorganized mob." And, without organization, they pose little threat during an election.

Despite their recent successes, the San Mateo County Motorcycle Association began, like most groups, by writing letters and submitting petitions to the five members of the Parks and Recreation Committee—one of the various departments that advises the five-man County Board of Supervisors.

IT ALL BEGAN WITH A SURVEY

In May 1968, at the request of the Parks and Recreation Department, a survey was conducted. The actual questionaire asked the public whether or not they would use an interconnecting trail system with three parking areas. 3457 cards were completed in favor of a motorcycle trail system in San Mateo County. Three individuals were against the proposal.

It was also determined that 68 percent would use the trails 4 times per month, 15 percent would use trails twice a month, 13 percent would occasionally ride on trails, and 4 percent would never use them.

In addition, county officials wanted motorcyclists to fill out a rather extensive questionaire. It asked each person for the estimated value of his equipment (possible tax information), and queried about possible membership dues, insurance costs, and an additional money bond.

PLAN ONE, FAILURE ONE

Based on the public's response, and encouraged by the apparent concern of the Parks and Recreation Department, Allen Bygdnes made some recommendations to Ralph H. Shaw, Director of Parks and Recreation for San Mateo County.

First of all, he suggested a reapportionment of existing county trails based on the number of participants in various trail activities.

Secondly, he asked for a readjustment of the membership of the trails committee itself so that its members would reflect the proportions of the various trail users.

Concerning the trail system, Allen Bygdnes recommended arranging the trails so that they would link the north, south, and central portions of the county. Plan one also called for three parking areas and the enforcement of a muffler/spark arrester law.

Although Allen Bydgnes and other concerned cyclists met with Shaw no less than 21 times, no action was taken.

CYCLISTS ON TRAILS COMMITTEE

Progress, however, was made. In September of 1968, two motorcyclists, Allen Bygdnes and Ray Abrams, a co-owner of A&A Motors in Redwood City, were appointed to the Trails Committee.

The Trails Committee is an official advisory subcommittee of the Parks and Recreation Department. Naturally, the purpose of this subcommittee, and the Parks and Recreations Department itself, is to provide recreational facilities for all of the people of San Mateo County.

The Abrams/Bygdnes appointment is a seemingly significant step in obtaining a riding area for cyclists, especially considering the current distribution of committee member interests. The 17-member Trails Committee is composed of 10 horsemen, two Sierra Club members, two motorcyclists, one Boy Scout representative, and two new members who have not expressed their recreational interests.

Since two motorcyclists were appointed, one is able to make a motion to the committee, and the other can second it. This is exactly what Abrams and Bygdnes did. But, when these proposals came to a vote, they were obviously at a disadvantage.

200 CYCLISTS SHOW CONCERN

Frustrated by lack of progress in the Trails Committee, Abrams, Allen Bygdnes, and attorney Dan Clapp went directly to the County Board of Supervisors and requested the board to provide motorcycle facilities for the county's 40,000 motorcyclists.

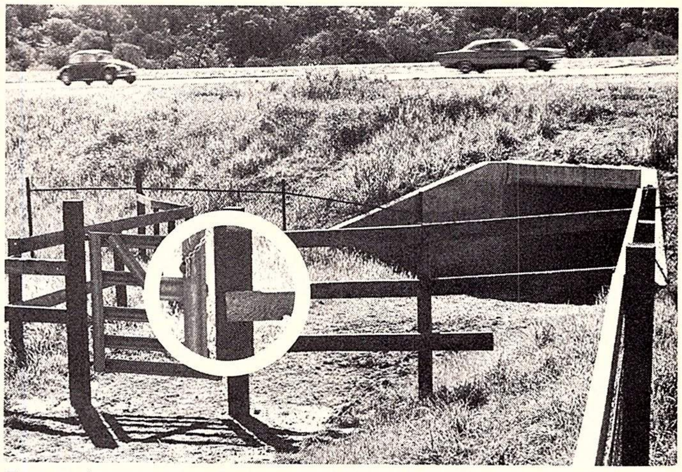
The date was March 24, 1970. All of the parking places surrounding the county's Hall of Justice were filled with motorcycles! More than 350 cyclists crowded into the supervisors' chambers to hear Clapp's argument that motorcyclists paid $650,000 in county taxes in 1969 while horsemen paid only $55,000. Said Clapp, "We pay 10 times as much and yet get nothing. We are tired of four and a half years of indifference."

But this display accomplished nothing. Facts were referred to the County Manager for review.

EQUAL REPRESENTATION DEMANDED

At one of the Trail Committee meetings, Allen Bygdnes discovered that it is the policy of the Trails Committee to drop members who have acquired three unexcused absences during one year.

Study of the committee's official attendance report re- →


Dick Sangalli Photo

Two underpasses were constructed jointly by the State of California and by San Mateo County. Cost to taxpayers was $60,000. The gate of this underpass is kept locked; only members of certain horse clubs have keys.

vealed that five members should have been dropped for missing meetings.

At the July 15, 1970 meeting, Charles Vogel, Chairman of the Trails Committee, announced that he was resigning because of a recent appointment to the Pacific Coast Trail Committee, which is constructing 2400 miles of federal horse trails. Vogel, also an officer of the State Horsemen's Association, felt he "could no longer handle all assignments without doing injustice to one or the other."

Because Vogel's resignation and the attendance rule would create six vacancies in the committee, Allen Bygdnes submitted a motion to appoint six motorcyclists to the Trails Committee to fill the vacancies.

KICKED OFF COMMITTEE

On July 28, 1970, just 13 days after the Bygdnes request to appoint motorcyclists to the Trails Committee in place of those who violated the attendance rule, Allen Bygdnes and Ray Abrams were officially dismissed from the Trails Committee.

The official reason for dismissal was the Abrams/Bygdnes/Clapp appearance before the County Board of Supervisors without Trails Committee approval. Curiously, this occurred almost three months prior to dismissal. Furthermore, there was no mention of dismissal during this interim period.

FAILURE FOUR

Following their dismissal, motorcyclists were informed that they would have to deal directly with the Board of Supervisors in all requests for recreational motorcycle facilities.

Logically speaking, San Mateo County's most recent motorcyclist proposal, the Hosking motorcycle park plan, should be a reality. Instead, it is the fourth cycle facility failure.

In the first place, the Hosking site is located within the area west of Skyline Blvd. and south of the Half Moon Bay road—an area which the county has recently designated for motorcycle park use.

Ultimately, this plan would have provided the county with a completely equipped park, including roads and trails extending from Skyline Blvd. to Portola State Park, with absolutely no cost to taxpayers.

SO WHAT WAS THE PLAN?

1. Allen Hosking made an agreement with a company headed by Carl T. Olson to lease or purchase 1560 acres of his property.

2. All acreage was to be deeded to San Mateo County, subject to deeds of trust.

3. All county motorcyclists would be voluntarily assessed $10 per year until the county tax assessor could provide such a tax. One dollar would be kept by the county to cover the cost of collection. The remaining $9 would be turned over to Olson to provide a profit, cover operating costs, and finance improvements.

4. In approximately 10 years, after the land and all improvements were paid for, all 1560 acres including improvements would be turned over to San Mateo County "to use as they will."

This request was denied by the County Planning Commission, and 40,000 cyclists still lack a place to ride!

5 YEARS, ZERO RESULTS

As noted earlier, the San Mateo County Motorcycle Association has been working for over five years to obtain county recreational facilities. Letters have been written. Petitions have been signed. Proposals have been made.

County officials have responded with a mere two page report, the findings of which represent almost 300 man years of work.

This report is not a pure research project, as its title "Motorcycle Research by the Department of Parks and Recreation, San Mateo County" suggests. Rather, it is a 10 paragraph, chronological summation of past motorcyclist proposals. No solutions are offered and it is easy to see why some motorcyclists believe that county officials are "dragging their feet."

Specifically, the report deals with the following: Discussions, but no agreements with two property owners concerning leasing property; two land offers by a ranch owner that motorcycle representatives opposed because of unsuitable terrain; two letters of introduction to lumber companies that achieved no results; and four proposals for commercial operations that have not been approved by the county.

In short, what little "research" this report contains is worthless!

ANSWER: ORGANIZED VOTING

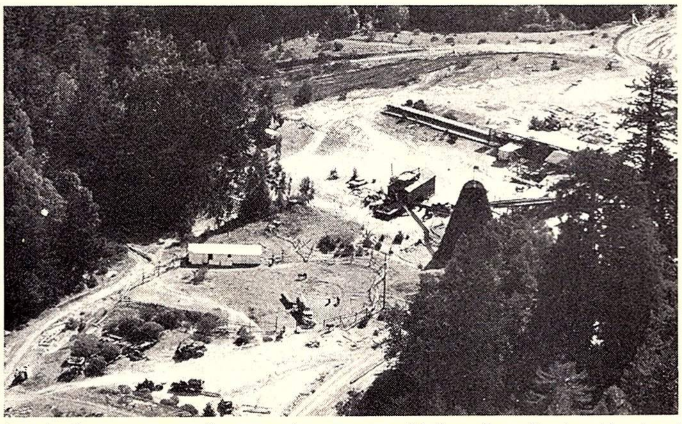
In order to get a proposal passed by county, city, or state government, it is necessary to have elected officials that are sympathetic to the cause at hand.

Today, in San Mateo County, organized voting is producing desirable results. Those in government who have repeatedly voted against motorcycle facilities are systematically being voted out of office. Because of this, San Mateo County motorcyclists will have a county-operated motorcycle facility in the forseeable future.

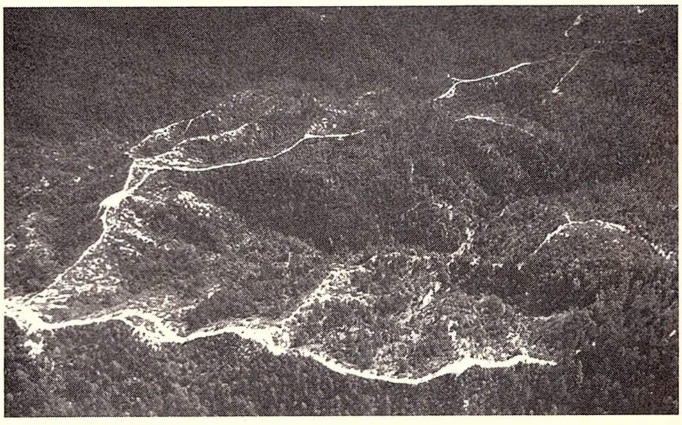
But more important, a successful political pressure group, like the San Mateo County Motorcycle Association, can be formed in any city or county in this country.

All it takes is a small group—say a half dozen guys—capable of organizing a political mailing stating the voting records of various elected officials shortly before an election.

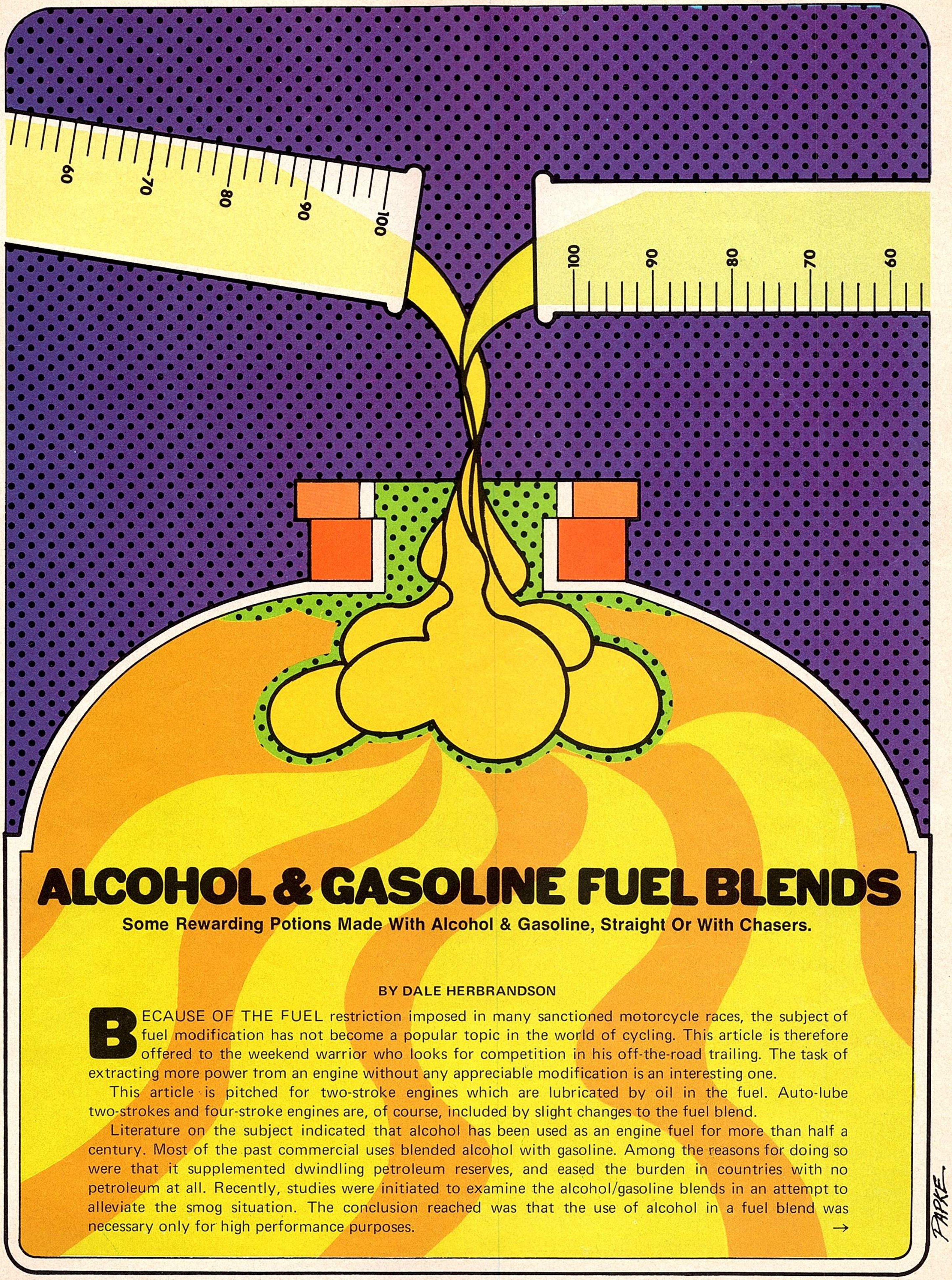
Land closure is widespread, but it need not be so. ◘



Ironically, motorcyclists receive more criticism for altering the land than the two lumber companies operating in San Mateo County.



Trails are commonplace in heavily wooded San Mateo County but a law, authored by Carl A. Britschgi, makes it illegal for motorcyclists to use them.



ALCOHOL & GASOLINE FUEL BLENDS

Some Rewarding Potions Made With Alcohol & Gasoline, Straight Or With Chasers.

BY DALE HERBRANDSON

BECAUSE OF THE FUEL restriction imposed in many sanctioned motorcycle races, the subject of fuel modification has not become a popular topic in the world of cycling. This article is therefore offered to the weekend warrior who looks for competition in his off-the-road trailing. The task of extracting more power from an engine without any appreciable modification is an interesting one.

This article is pitched for two-stroke engines which are lubricated by oil in the fuel. Auto-lube two-strokes and four-stroke engines are, of course, included by slight changes to the fuel blend.

Literature on the subject indicated that alcohol has been used as an engine fuel for more than half a century. Most of the past commercial uses blended alcohol with gasoline. Among the reasons for doing so were that it supplemented dwindling petroleum reserves, and eased the burden in countries with no petroleum at all. Recently, studies were initiated to examine the alcohol/gasoline blends in an attempt to alleviate the smog situation. The conclusion reached was that the use of alcohol in a fuel blend was necessary only for high performance purposes. →

FUEL BLENDS

Both ethyl alcohol and methyl alcohol have been carefully studied in the dyno room. A tremendous amount of data was compiled in the period between 1920 and 1940. Results show that the poisonous methyl alcohol is preferred over the drinkable ethanol as far as a racing fuel is concerned. Thus, when alcohol is mentioned further in this article, it is methyl alcohol.

ENGINE PERFORMANCE

Before we examine the alcohol blends in detail, let's first look at an actual engine test. The graph below shows the effect of substituting methanol for gasoline in a 100-cc, reed valve, two-stroke engine.

The curve for the alcohol-based fuel shows a power increase of almost 10 percent over gasoline. Note that the spark timing and compression ratio were optimized for gasoline. More spark lead and compression would have shown a further gain for the alcohol blend. Although 10 or 12 percent is not a large boost in power, it is rather comforting to know that it's available by simply tipping the can and then adjusting the carburetor jetting.

One might expect that, to produce such a power increase, methanol must be a high energy fuel. Actually, alcohol is a relatively poor fuel. Given an equal volume or weight burned in air, gasoline generates over twice the BTUs per pound of fuel.

Alcohol's chemical makeup causes the fuel to burn extremely lean in a carburetor jetted for gasoline. The excess oxygen in the lean mixture accrues from the fact that methanol is 50 percent oxygen by weight. To maintain a stoichiometric (chemically correct) air/fuel ratio with methanol, the fuel flow must increase by a factor of 2.3!

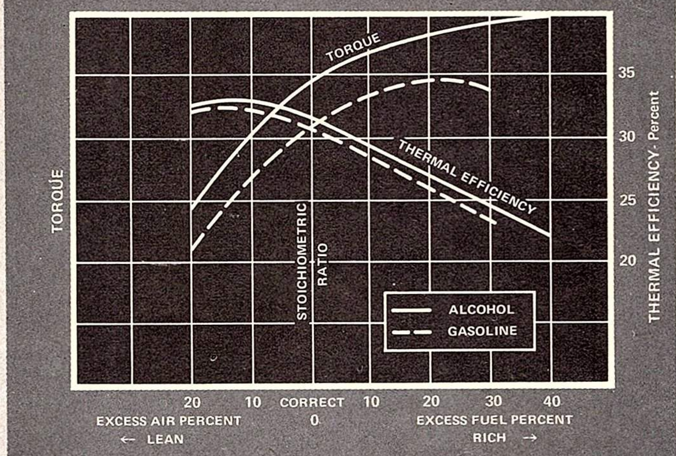
An engine fueled with gasoline usually produces its peak output when 20 percent excess fuel is used. Alcohol fuels, on the other hand, continue to increase engine output up to a mixture that is 40 percent richer than stoichiometric. This very rich alcohol mixture is quite inefficient, as it is accompanied by incomplete burning of the charge. This fact points out the air/fuel tolerance of alcohol-based fuels. The graph at right shows the general shape of the mixture curve at a given engine rpm.

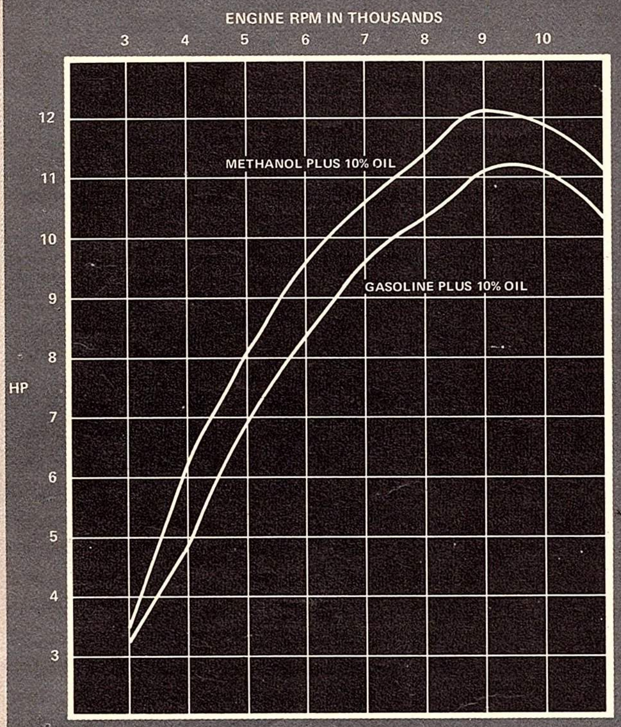
Remember that a correct air/fuel ratio of alcohol is 2.3 times that of gasoline. At 40 percent excess fuel, alcohol requires almost three times the fuel consumption to obtain the same engine output that is available with gasoline at a 20 percent over-rich condition.

The increased power output available from methanol cannot be attributed to the energy of the fuel. The power increase comes from the cooling effect produced by the oxygen-bearing fuel.

VAPORIZATION

In comparison to gasoline, methanol has a very high latent heat of vaporization. Per pound of fuel, methanol requires over three times as much heat for conversion from liquid to a vapor. Multiply this number by the increased fuel flow required and the result is a pronounced cooling effect on the





air/fuel mixture. Cooling is easily noticeable in an alcohol engine, as the carburetors are very cool, and may even become frosty.

Increased output from engines using methanol has generally been explained as a result of the chilling of the air/fuel charge. The logic is that a cool mixture would be more dense, and the engine would consume an increased mass of charge, with an increased volumetric efficiency.

The chilled charge hypothesis applied to methanol cannot be substantiated by airflow rate measurements. The results usually reported show only a very small increase in volumetric efficiency when using alcohol or alcohol/gasoline blends. Various researchers have concluded that the major power increase is due to the reduced work required on the compression stroke.

Since high performance engines do not supply carburetor heat to vaporize the fuel, the methanol enters the engine in a partially vaporized state. During compression in the cylinder, the wet air/fuel mixture vaporizes (due to the heat of compression) and greatly reduces the temperature of the charge. This absorption of heat retards the pressure rise (which lowers the work of compression) and also reduces the tendency to detonate.

ALCOHOL/GASOLINE BLENDING

The first part of this article pointed out that methanol can be used to obtain a respectable power increase, but only at the expense of high fuel consumption. We can easily trade lower performance for better economy by mixing the two fuels.

Alcohol and gasoline are completely miscible in all proportions—providing that the alcohol is anhydrous (water free). Even small additions of water to the blend will cause separation. For example, the water that can be tolerated in a 25 percent alcohol/75 percent gasoline blend at room temperature is about 1 percent. If an additional 1 percent is added, the mixture will become cloudy and finally separate into two distinct layers (the water is absorbed in the alcohol, and both settle to the bottom). Separation is also promoted by lowering the temperature. Blending agents can be added to stabilize the mixture. Among these are acetone, butyl alcohol, and benzol (a commercial purity of benzene). For this reason the gasoline/alcohol fuels also contain small percentages of benzene and/or acetone.

The aromatic compound, benzene, is, incidentally, a respectable motor fuel. It produces an output identical to gasoline for a stoichiometric air/fuel ratio. Benzene has a higher latent heat content than gasoline; track testing has shown that when benzol is blended with gasoline the engine operating temperature is reduced.

THE GASOLINE-BASED FUELS

The first blend below can be used in a stock carburetor without modification. The stock spark plug and jetting can be used. The engine should have the same output as on gasoline; the only bonus is that the engine should run somewhat cooler than before. All percentages are listed on a volume basis. →

FUEL BLENDS

Blend 1	80%	Gasoline
	10%	Benzol
	10%	Lubricant

Blend 2	45%	Gasoline (unleaded)
	20%	Benzol
	20%	Methanol
	4%	Acetone
	10%	Lubricant

By adding alcohol to the fuel as shown in blend 2 we come up with an interesting combination. Not too much work is required to tune the replaceable main jets in the carburetor (it is a requirement). The blend will work well with stock compression and standard spark lead. There will be a noticeable increase in power output, and a large change in the odor of the exhaust. The methanol, and especially the benzene, have a different and somewhat agreeable odor. Blend number 2 is a good place to start. You should use one range colder spark plug as a precaution when tuning.

The next fuel mixture retains some gasoline. Benzene is still required as the mixing agent. Note that the methanol is becoming the predominate ingredient. This blend may require carburetor modification to pass the required fuel flow. The replaceable jets can only be enlarged to a point where they equal the size of another restriction somewhere else in the fuel stream. It could be possible to have an inlet needle that is unable to cope with the demand.

Blend 3	21%	Gasoline (unleaded)
	10%	Benzol
	55%	Methanol
	4%	Acetone
	10%	Lubricant

Blend number 3 will produce respectable power over gasoline without drastically altering the driving range of a motorcycle. A trail bike would have around half the driving radius using blend 3 in place of pump gasoline. This is not bad as long as the operator is willing to trade performance for a few more fuel stops.

It should be pointed out that all of the blends in this article are set up for the two-stroke engine. If you want to try these blends in an auto-lube two-stroke or a four-stroke unit, the 4 percent acetone blender and 10 percent lubricant will not be required.

ALCOHOL-BASED FUELS

Before using the following fuels, the user must be aware of a few simple requirements.

First, the carburetor must be modified to pass two to three times the amount of fuel through metering orifices initially set up for gasoline. This will require careful examination of all passages, from the fuel tank to the discharge of the main jet. A knowledge of the metering characteristics of the carburetor is essential.

Even though methanol has an octane rating of almost 100, it will detonate if provoked. Years ago, a mystique was generated about the knock-suppressing tendencies of alcohol. The ideas were accurately formulated in the 1940s when the highest octane gasolines were in the 80 range. With today's high octane gasolines, the effectiveness of methanol as a knock suppressor is not too important.

A *cold* spark plug is essential for blends 4 thru 7! I have successfully used plugs as cold as Champion N-52R in a fully modified Yamaha 100 Twin. When the warmer NGK 10 plugs were fitted, the engine immediately went into detonation and burned a piston. The number 10 plug is fairly cold by gasoline standards, but was entirely unacceptable when burning blend number 4.

Ignition timing must be advanced to match the burning rate of the fuel blend; this rate is also influenced by compression ratio. Both methanol and nitro are relatively slow burning. An advance of around 30 degrees before TDC will be required for optimum performance. The compression ratios referenced below are to be measured using the effective stroke (in a two-stroke only) above the exhaust port.

Methanol, acetone, and nitromethane are powerful solvents; they will swell any rubber seals that were compounded for use with gasoline. Especially critical is the Viton-tipped inlet needle used on many carburetors. A metal needle must be fitted in its place.

Blend 4	(12:1 Max. compression ratio)	
	76%	Methanol
	10%	Benzol
	4%	Acetone
	10%	Lubricant

Blend 5	(10:1 Max. compression ratio)	
	76%	Methanol
	5%	Benzol
	5%	Nitromethane
	4%	Acetone
	10%	Lubricant

Blend 6	(8:1 Max. compression ratio)	
	66%	Methanol
	15%	Nitromethane
	5%	Gasoline
	4%	Acetone
	10%	Lubricant

Blend 7	(7:1 Max. compression ratio)	
	55%	Methanol
	25%	Nitromethane
	6%	Gasoline
	4%	Acetone
	10%	Lubricant

Blends 5 thru 7 are not recommended as a starting place for the uninitiated. The nitrated fuels are difficult to work with but secure top notch results. If the mixture, spark lead, and spark plug are not correct it is terribly easy to burn a piston. However, if all is in order, blends like number 7 are quite impressive.

ENGINE DEPOSITS

Many researchers have reported that the lower-molecular-weight alcohol burns with less soot and deposits than the hydrocarbon gasolines. Methanol appears to be a relatively clean burning fuel. Tests conducted on a four-stroke V-8 by Southwest Research Institute showed that a blend of 75 percent unleaded gasoline and 25 percent alcohol produced only 1/7 the deposit of a commercial leaded gasoline. Our blends 2 and 3 therefore should be well adapted for trail use, as they are not dirty fuels. This cleanliness should promote spark plug life in the prone-to-foul two-stroke engine.

CONCLUSIONS

Methyl alcohol fuel blending offers some distinct advantages over pump gasoline as a high performance fuel. If done correctly, the modification will not harm the engine, and should even promote longevity due to the cleanliness of the brew. Fuel blending is an interesting and rewarding way to pour new life in your present machine.

MOTORCYCLING: A "RISK EXERCISE"

Would You Like To Participate In A Fascinating Research Project? Fill Out The Questionnaire And Mail To The Address Indicated.

IN THE BEGINNING, man's very existence depended on physical activity. Foolhardy adventure meant almost certain death. But, through calculated risks, early man was able to secure food and shelter.

Today, neither strenuous physical activity nor calculated risk is necessary for survival. Nevertheless, both exercise and calculated risk, according to Dr. Sol Roy Rosenthal, professor of preventive medicine at the University of Illinois College of Medicine, are necessary to maintain the physical and mental balance necessary for well being.

Dr. Rosenthal has been involved in sports all his life. He plays tennis, a physical sport that does not involve risk. After a game, he feels tired and wants to rest.

Dr. Rosenthal, however, is also an avid horseman and goes fox hunting frequently. Fox hunting involves risk, as does off-road motorcycling or fast touring, because of the uncertainty of terrain. Following a typical hunt, both he and his fellow horsemen feel elated.

On the basis of his own experiences, and by studying other sports involving calculated risks, Dr. Rosenthal has come to the conclusion that calculated risks, on a physical and mental basis, are necessary for our daily well being.

Furthermore, Dr. Rosenthal believes that a substance (or substances) produced in the blood stream is (are) responsible for risk exercises response. If such a substance exists, he believes it may be beneficial in certain depressed states.

It should be noted, however, that the feeling of elation is not unanimous. In this case, the motorcyclist must be well trained in his particular branch of cycle sport so that his risk is a well calculated one.

Novice riders may be "petrified" with fear, which often leads to exhaustion, not elation, following a ride.

The following questionaire has been designed to gather as many case histories as possible to further the risk exercise thesis. We hope to publish the results of your response to this study in a few months.

1. Sex: Male or Female (circle)
2. Age ....

3. Check your RE sport or sports in order of proficiency (1, 2, 3, etc.)

Boating and Sailing ....
Swimming ....
Fencing ....
Skiing ....
Surfing ....
Hunting ....
Flying and Gliding ....
Boxing ....
Wrestling ....
Fox Hunting ....
Horseracing ....
Ski Jumping ....
Water Polo ....
Ice Hockey ....
Rugby ....
Motorcycling ....
Horseback Riding ....
Outdoor Living ....
Archery ....
Water Skiing ....
Mountain Climbing ....
Fishing ....
Scuba and Skin Diving ....
Judo ....
Auto Racing ....
Harness Horseracing ....
Ice Boating ....
Sky Diving ....
Football ....
Polo ....
Soccer ....

4. Name of your favorite RE sport? ....
   - a. Number of years participated in this RE sport? ....
   - b. Number of years spent in training (learning or lessons)? ....
   - c. Do you consider yourself (check one)
     - Expert to .... Above average
     - Average to .... Good
     - Fair to .... Poor
   - d. Are you frightened participating in this RE sport? Yes .... No ....
   - e. Degree of apprehension?
     - (1) Before taking up RE sport
     - (2) While learning
     - (3) At present

(Check)	(1)	(2)	(3)
Great	....	....	....
Moderate	....	....	....
Slight	....	....	....
None	....	....	....

f. Do you enjoy participating in this RE sport?

Very much ....
Moderate ....
Indifferent ....

g. After participating in this RE sport, what are

(1) Your physical reactions:

Indifferent (fair to poor)..........................
Fine (good) ....
Invigorated (very good) ....

(2) Your mental reactions:

Depressed ....
Indifferent ....
Good ....
Elated ....
Euphoric ....

5. If you participate in more than one RE sport, list the sports in decreasing order according to the following:

Physical reactions

a. ....
b. ....
c. ....

Mental reactions

a. ....
b. ....
c. ....

6. Have you noted at times that you may have to force yourself to participate in RE sports because you feel dejected or depressed, but after participating you feel elated?

If yes, ... explain:

7. Have you had certain problems bothering you before participating in RE sports but find that after participating the problems seem resolved?

If yes, ... explain:

8. When does this feeling of well-being occur?

During participation ....
Shortly afterwards ....
Long afterwards ....

How long does it last? ....

9. Do you participate in Non-RE sports? If yes, list: (consider calisthenics, jogging, walking, etc., as a Non-RE sport)

10. What physical differences have you noticed when participating in RE sports in contrast to Non-RE sports?

(Check)	RE	Non-RE
Indifferent (fair to poor)	....	....
Fine (good)	....	....
Invigorated (very good)	....	....

11. What mental differences have you noticed when participating in RE sports in contrast to Non-RE sports?

(Check)	RE	Non-RE
Depressed	....	....
Indifferent	....	....
Good	....	....
Elated	....	....
Euphoric	....	....

PLEASE RETURN TO:

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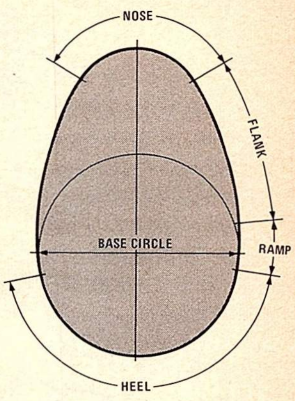
The Cam: A Basic Primer

The Cam Is A Timing Device . . . Part Of A Valve Train Which, In Its Multitude Of Forms, Layouts And Profiles, Deals With The Problems Of Mass, Velocity, Time, And Gas Inertia.



THE CAM, inherent in the operation of a four-stroke engine, is one of the most talked about, yet least understood, components.

Basically, a cam is a timing device, controlling valves which admit a fuel/air mix into the combustion chamber and allow burnt gases to exhaust. Most people understand that.

But the mystery of the camshaft has to do with its timing aspect. Some times are more appropriate to admit the fuel/air mix and exhaust burnt gases than other times. Further confusing the issue is the way in which the cam is made to operate on the valves, as well as its location in the engine package and the location of the valves. So we would do well to discuss the principal cam-operated layouts and their relative merits.

Four-stroke engines in current production use one of the following valve train layouts to permit a fresh charge of fuel/air mixture into the cylinder and the burnt exhaust gases out of the cylinder: side-valve, push-rod operated overhead valve, overhead-cam and desmodromic.

The side-valve engine first found favor because of its ease of manufacture, low cost and reliability. Thousands of side-valve engines were produced for military and utility use where low upkeep and ease of maintenance were of major importance. In the side-valve engine, the valves are parallel to each other and are located alongside the cylinder. The main disadvantages of the side-valve design lie with the fact that the gas mixture must change direction twice during the four-stroke cycle; and because of the large combustion chamber area and room that is needed for valve-to-cylinder head clearance, the compression ratio must remain low.

Perhaps the most sophisticated example of the side-valve design is found in the Harley-Davidson K-series racing machines. H-D continued development of these engines long after other manufacturers had dropped the side-valve from their lines, and finally obtained power outputs of over 55 bhp from 45 cu. in.

A distinct advantage of the side-valve engine is the simplicity and efficiency of the valve train. The cams operate followers which bear directly on the valves, and all motion is kept in the same plane.

The overhead-valve layout has been the most prevalent design in recent years. Although more complicated in

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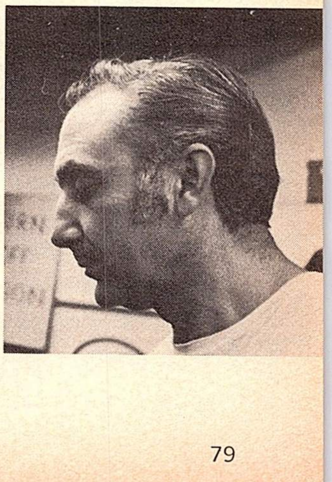
Interview: Norris Barsumian

We Venture Into The World Of Camshaft Esoterica, Where A Little Means A Lot, If Going Faster Is The Goal.

BY JODY NICHOLAS



WITHIN THE SHORT SPAN of three years, Norris Performance Products has grown from a two-man operation to one of the most respected names in racing cams for both automotive and motorcycle engines. It's still not a large company, but it is growing steadily, and is constantly improving its products.

Norris Barsumian is a motorcyclist who was previously involved with electronics, while Norris Baronian formerly held the position of general manager of Iskenderian Cams. Working together, they have produced cams for record-holding cars and motorcycles all over the U.S. Danny Macias, head of the Triumph-BSA racing effort in the U.S., has been using Norris cams for a couple of years, as has Harold Allison, the tuner of the Norton 750 which carried me to many victories at Ascot Park this past season.

What, then, is the secret behind these fast machines? We feel that the cams played a very important part. One which we wanted to know more about.

CAM LOBE DESIGN

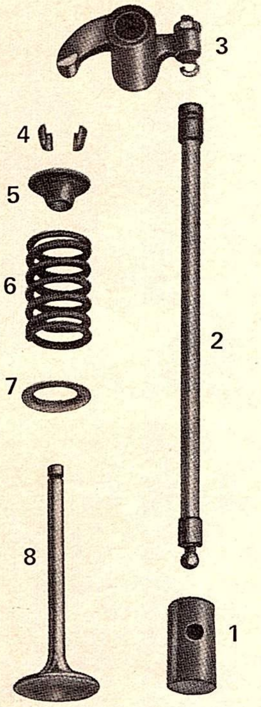
CW: *Now that we know some of the basic terminology regarding cams, could you explain a little more?*

Norris: Sure. On any cam there is an opening ramp and a closing ramp. They may be the same (symmetrical) or they may have different (asymmetrical) characteristics. Our cams for Triumph and Norton are symmetrical, but the Honda cams are asymmetrical, for a reason I'll explain in a moment.

Most of the actual lift occurs in the flank portion of any cam, but it's important to have a good combination between the rates of lift of all three basic parts of the lobe. For example, a cam could be designed to have a rather quick-lifting ramp, and have the rate of lift slow down somewhat in the flank section. We've found that a maximum rate of lift of 0.007 in. per degree of crankshaft rotation works extremely well in the 650 Triumph.

CW: *What determines the amount of valve clearance, or "lash," in any particular engine? We know, for instance, that you set the valves for zero lift on a Royal Enfield Single, but the figure for other machines is often in the region of 0.010 in.*

Norris: Valve lash is determined by the engine designer (or by the cam designer), and is directly related to the amount of "growth" experienced by the cylinder and valve train components when an engine gets up to operating



The complete valve system, less the cam, of the 750-cc Moto Guzzi Ambassador. The parts are labeled for identification: 1) lifter, 2) pushrod, 3) rocker arm, 4) split collets (keepers), 5) valve spring retainer, 6) valve spring, 7) valve spring shim, 8) valve.

design and manufacture than the side-valve engine, the greater efficiency and power output from the overhead-valve engine has greatly outweighed the complexity and production costs. Overhead-valve engines are able to use higher compression ratios, and the valve locations possible with such a design lead to much more power and less fuel consumption. Other advantages of the overhead-valve design include a better spark plug location within the combustion chamber, a more direct gas flow and better valve cooling.

Disadvantages of the overhead-valve design are mainly concerned with the valve gear. For example, in an engine such as the Triumph Trident, the cams' oscillatory motion is changed to straight-line motion through a tappet, which rides on a pushrod, which in turn bears on a rocker arm. The rocker arm reverses the straight-line motion and its end controls the opening and closing of the valve. Continuing development and better metals have allowed the overhead-valve engine to turn over at high speeds and develop high power outputs.

The overhead-cam engine currently is the most popular in America in terms of sheer number. Honda popularized the overhead-cam engine for general use some years ago, and such manufacturers as Ducati and, recently, Yamaha, add their sales to the growing number.

The overhead-cam engine combines all the advantages of the overhead-valve engine and is generally more efficient mechanically because the lifters, pushrods and, in some cases, the rocker arms are done away with entirely, thus saving reciprocating weight and thereby permitting the engine to turn at higher rpm. The main drawback of an overhead-cam engine is the drive mechanism for the cam itself. Gear trains are costly to manufacture and noisy in operation, as are bevel drives from the crankshaft. The most popular method of driving the cam is by chain, which is inexpensive to manufacture, gives virtually silent running and is easy to maintain. Honda's entire line, Yamaha's 650 and BSA/Triumph's dohc 350 employ chain-driven camshafts.

A fourth type of valve system currently in production is the desmodromic one which uses one cam to open each valve and another to close it. Theoretically, the desmodromic valve mechanism should be the most efficient in terms of valve control, but they are

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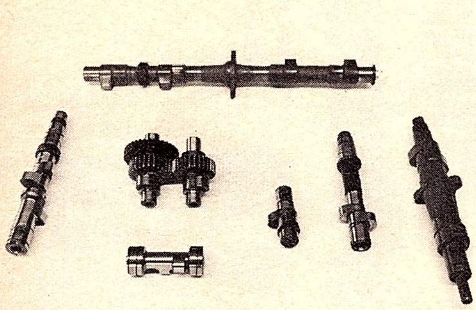


temperatures. A Harley Sportster will run along with about 0.016-in. valve lash when hot, but the clearance is nil when the engine is cold.

One thing most people don't realize is that you can alter the characteristics of a cam merely by varying the amount of lash in the valves. You can squeeze down on the lash if you need a little more top end, or you can open up the clearance a little if the cam (like ours) has a long ramp area and gain a little mid-range power and torque. It's best not to overdo this, however, as too much lash will cause damage to certain of the valve train components, and too little could cause the valves to burn. Most people don't realize that cams are "adjustable" like this, but it's best to get the information from the cam designer, or some authority, before making any radical changes. Another reason for valve lash is to allow the valve to sit on its seat and cool.

There's less you can do in this area with an overhead cam machine because of the lesser amount of variance between hot and cold clearances. Getting back to the asymmetrical lobe design of a Honda, it is because they use a finger-type follower that the lift ratio isn't the same on both sides. The cam rotates in only one direction, but the followers are on both sides of the cam. On one of the followers, the cam is picking it up from the back side of the lifter shoe, and on the other, it begins lifting on the front side. As the cam sweeps across the lifter either towards the central pivot point, or away from it, the ratio of lift is constantly varying. Hence, the cam lobe must be ground accordingly to obtain a symmetrical opening/closing rate for the valve.

PROCESSING A CAM

CW: *What happens to a customer's cam when it comes in for a regrind?*

Norris: First, the cam bearings are checked to make sure they're not out of round, and I look to make sure there's enough material on the lobes to permit a regrind. We then grind the cam and send it out for a special heat treating which doesn't distort it. After another check we send the cam back out for a double lubing. It's first Parkerized (an acid and manganese iron high-temperature process which deposits a non-metallic lubricant into the pores of the metal) and then dry-lubed, using an aircraft process which involves baking.

CW: *Isn't that like Microseal?*

Norris: It performs the same job as Microseal, but it's not the same process.

quite complicated and expensive to manufacture and generally noisy in operation. Ducati is the only motorcycle in general production today which offers a desmodromic valve system.

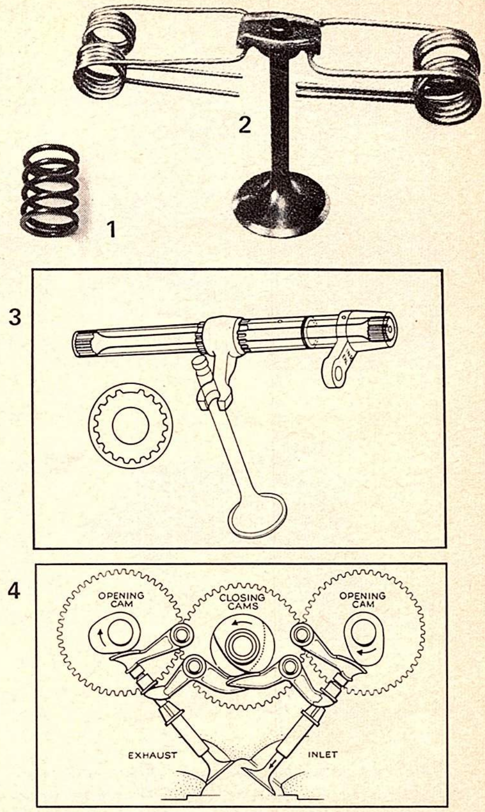
The most important single factor governing an engine's performance is the valve timing. Slight variations will cause the engine to produce good power at high revolutions, or have less total output but more power in the lower rpm ranges. It would seem that any engine having the breathing ability to produce power at high rpm should also have power at the other end of the rpm scale, but such is not often the case.

Because of the nature of air, which has weight, the engine designer runs into difficulties. Like anything that has weight, air has to be set into motion. If air were weightless, there would be no problems. The intake valve could be opened at top dead center, as the weightless air (fuel/air mixture) would begin moving into the cylinder at once. The intake valve could then be closed at bottom dead center because the air would cease to move.

On the other hand, if air were weightless, the exhaust valve could be opened at bottom dead center after the power stroke and all the burnt gases would rush out the cylinder and would stop when the piston again reached top dead center.

However, because moving air has inertia, it goes into motion slowly at first and gains speed as the piston draws it into the cylinder. When the piston is at bottom dead center, air is still trying to get in, and if the inlet valve were closed at bottom dead center, there would still be air trying to get in. The same is true of the exhaust. The burnt gases would not begin moving out of the cylinder immediately because of the low inertia of the charge, and some would still be trying to get out as the valve dropped closed at top dead center. As we can see, it takes time to get air in motion, and once in motion it has a tendency to stay in motion until it is acted upon by another force.

Knowing the physical properties of air (and air combined with fuel), the cam designer can use the inertia to advantage. As the incoming air rushes into the cylinder when the inlet valve is opened, its inertia has a tendency to keep it coming even *after* the piston has reached bottom dead center and has come back up on the compression



Various methods of closing the valve: 1) coil spring, 2) hairpin spring, 3) torsion bar, 4) desmodromic system.

The main idea is to allow the cam lobe and lifter to "mate"; that is, to form a rubbing surface on each. Most cam lobe and lifter failures occur in the first few minutes of operation, before the rubbing surface is properly formed. We also include an assembly lube with our cams for the guys to use so that the parts stay lubed until oil pressure reaches them. It makes a big difference in the life of the parts.

CW: *What do you do when a cam has to be built up to get enough lift after regrinding?*

Norris: We use one of two processes, either heliarc or acetylene welding. We use the heliarc on most cams because the metal flows onto the lobe more densely. With acetylene, the cam has to be heated so high that controlling the flow of the rod is often difficult. It just runs all over. But we have to use acetylene on Honda cams because they have a form of graphite introduced into the lobes to alleviate the wear problems they used to have. Trying to hard-face over a lubricant like graphite is tough, but we now use a new rod which works very well.

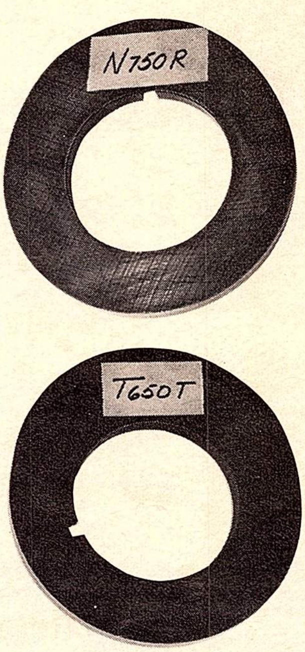
On the built-up cams, we grind a groove in the center which begins on the ramp, continues through the flank, up over the nose, and down the other side. The hard-face is then laid beginning in the center of the groove and is layered to a thickness of 1/8 in. or so at the top of the nose. Even after grinding, there is enough hard-face to keep from going into the original material, and with the groove full of the hard-face material, it doesn't matter if you do grind a little below where the original material was.

LIFTER DESIGN

CW: *What influences lifter design? We know that some machines use a radiused lifter, while others use a flat tappet, and a few use a roller tappet. Which is best, and why?*

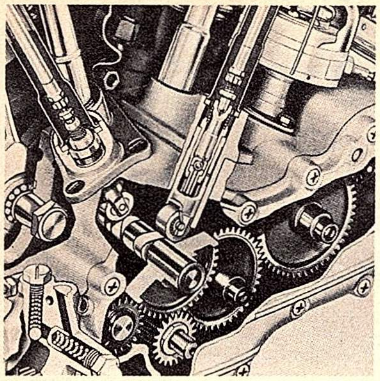
Norris: The lifter design is really an outgrowth of the engine's design and the purpose for which the machine was originally designed. A roller tappet requires a larger base circle on the cam than a flat tappet with the same lift and duration characteristics, but is usually quieter in operation. A flat or radiused tappet can be made almost as silent through the use of quieting ramps on the cam lobe itself. A quieting ramp merely begins the lift pattern a little earlier and more gradually.

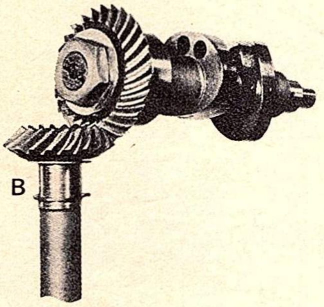
With a racing engine, however, noise is of little consequence, and the most important considerations are to get the



"Master" cams for the Norton (above) and Triumph (below). These devices are patterns for grinding a customer's cam and fit on the end of the cam grinding machine.

The Cam





A *Roller tappets and hydraulic lifters are featured in the Harley-Davidson 74 engine, providing silent running and long life.*

B *Bevel gear drive to the overhead camshaft is a feature of Ducati engines.*

stroke. The same thing happens with the exhaust, only in reverse. The inertia of the outgoing exhaust gases continues to make the pressures within the cylinder fall, and in some cases actually creates a negative pressure.

By taking advantage of this phenomenon, the cam designer can open the inlet valve even before the piston has come to top dead center, and with the exhaust valve open, the outgoing gases start the incoming charge moving, pulling it into the cylinder. You might think that the exhaust gases would blow the incoming charge back out the carburetor, and on some very long duration cams this happens at low engine speeds. Once the engine speed has been increased to within the operating parameters of the cam, a slight *supercharging* effect takes place.

Cam design, then, is the most important factor governing an engine's power characteristics. If an engine is designed to operate at low speeds, the *duration* (number of degrees of crankshaft rotation the valve is held open) may be quite short. As engine speed goes up though, the physical properties of air make it necessary to hold the valves open for longer periods of time to fully pack the cylinder with all the air it can possibly get. Durations of over 300 degrees are commonly found on racing cams. *Overlap,* the period at the end of the exhaust and at the beginning of intake, when both valves are held open at the same time, is also directly related to the engine's intended use. A low rpm engine will have a cam with less overlap than one which must turn at high rpm.

Other considerations the cam designer has to take into account are the various components in the valve train. The cam must have something to push on to eventually open the valve and allow it to close. These devices are called cam followers or tappets, and may be of the flat, radiused or roller variety. All have their advantages and limitations, and all are constructed from the finest steel, usually with a high nickel content, and are heat-treated to reduce wear.

Flat or radiused tappets can be made very light, and with today's high quality steels and excellent lubricants, wear is usually not a serious problem. Roller tappets are somewhat heavier than either the flat or radiused tappet, and have a tendency to "skid" in some applications as the cam begins taking up

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Barsumian

valve open as quickly as possible, hold it open a long time, and then get it closed.

CW: *Do you make any roller tappet conversions for the British and Japanese machines?*

Norris: No. We don't feel that they're necessary and they do have several disadvantages. First of all, they're expensive, and they take up more room. The rollers also have a tendency to slide or skid over the lobe at high rpm, and the needle bearings inside the roller often fail under such conditions. They work well in large V-8 car engines because the cam lobes and roller diameters are large, but not in high-rpm motorcycle engines. The Triumph uses a radiused lifter that approximates a roller lifter's shape, so we use a "roller profile" grind on the cam.

CW: *What about the ratio of the rocker arm on an overhead valve engine?*

Norris: Well, the ratio of the rocker arm is decided by the engine designer, and we haven't found it necessary to change it on a motorcycle engine. If we want a valve lift of 0.400 in., and we know a rocker arm ratio is 1.2:1, we grind the cam to have a lift of 0.352 in. Most of our cams have higher lift and longer duration than our competitors' cams, but we've been able to get good results because of other techniques we use.

THE VALVE SPRING

Norris: The valve spring's function is to control positively the opening and closing of the valve. But the spring also has to force the valve, rocker arm, pushrod and tappet back into their relative positions after the cycle has completed itself so that another cycle can take place. But it's not as simple as all that. At high rpm, stresses on the valve train are multiplied greatly, and therefore spring pressures are often as high as 400 psi when the valve is fully open.

CW: *We notice that you have a flat third spring between the inner and outer valve springs.*

Norris: Yes, it's called a damper spring and it serves to reduce the harmonics that the valve springs set up during their operation at different rpm. The springs behave much like a quitar string in that they flex in the middle, setting up a harmonic vibration. This harmonic upsets the springs to such an extent that premature valve float often sets in, keeping the engine from developing its maximum power. And it can also cause

Norris prefers double straight-wound valve springs with a third, flat-wound spring in between to cancel out harmonics.

its lift. The roller is at its best when large-diameter components can be used with heavy valve train components and springs.

The pushrod in an overhead-valve engine must be made as light as possible to eliminate bending or flexing, thus permitting high rpm while accurately controlling the valve's opening and closing. A long, weak pushrod has a tendency to flex or "whip" at high rpm, causing valve timing to vary radically. With an overhead cam engine, of course, there is no pushrod.

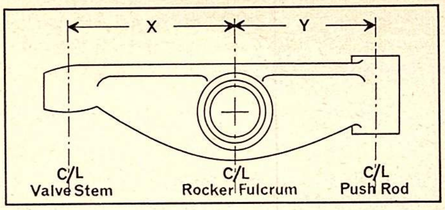
Rocker arm design has remained fairly constant over the past few years, with the "I-section" approach being the most popular. It is relatively easy to manufacture and is very strong. Rocker arms are quite often longer from the fulcrum (pivot point) to the valve end than from the fulcrum to the pushrod end. This difference in length determines the rocker arm ratio and is used to open the valve to a greater extent than the lift of the cam. This is an advantage in that the physical size of the cam cavity can be smaller, reducing in some instances the size of the crankcase casting.

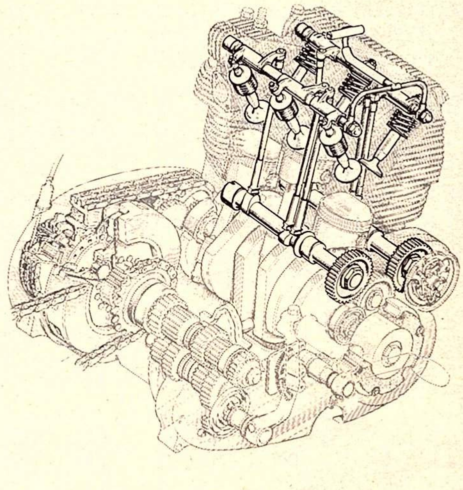
But all this valve gear, and the valve itself, has the same disadvantage that air has: it has inertia which must be overcome.

Obviously, the valve cannot be opened or closed slapdash because of possible damage to it and other of the valve train components. The valve must be eased open and then eased closed, but in the most rapid manner possible. Therefore, the cam designer has another headache which he must overcome to get the best performance out of an engine with maximum reliability. On a high-performance engine he must accelerate the valve open to its maximum lift as quickly as possible, hold it open as long as possible and then have it close again.

In all valve systems except the desmodromic, closing the valve is the responsibility of the valve spring, which must also return the rocker arm (and in the case of the overhead-valve engine, the pushrod and lifter) to its original position before the valve can close. Hairpin valve springs were brought into use during the 1930's because they could be made stronger than the coil spring, but today the coil spring reigns supreme and is in almost universal use.

(Continued on page 114)





C *Differences in distances between X and Y in this photo depict the rocker arm ratio.*

D *The BSA Rocket Three features a relatively high camshaft location with short pushrods, allowing high rpm.*

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damage to other components in the valve train.

The idea of the damper, then, is to put in a stiff spring between the inner and outer valve springs which is coiled in the opposite direction. This damper actually touches the other springs when they begin to go into harmonics, and has a reverse effect, and a cancellation effect occurs. Any drag between the three springs is reduced to practically nothing shortly after the engine is started as they "lap" themselves in.

Using this design, we can effectively use lower spring pressure for a given rpm limit. For example, all our springs are constant rate, but the pressure of the valve on its seat in a 650 Triumph is only 90 lb. This low pressure means less cam lobe wear, and eases the strain on all components. We use and believe in this, not because it's something new, but because it works. I've had customers with both Nortons and Triumphs pick up 300-500 rpm just by changing to our springs.

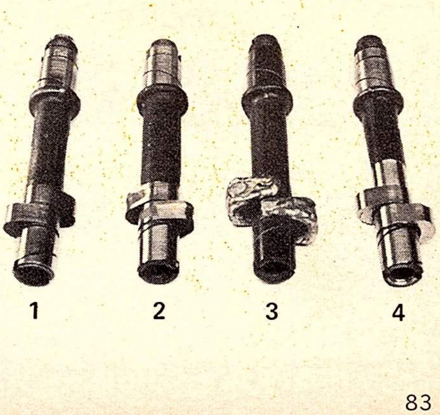
CW: *You also advocate the use of your titanium retainers with your cams?*

Norris: Yes, there is quite an advantage to using titanium for the retainers instead of steel or aluminum. Titanium is lighter than steel and almost as strong. Although aluminum is lighter than either of the other materials, it isn't nearly as strong. Every ounce you can save in the valve train is worth its weight in gold.

INTAKE AND EXHAUST TUNING

CW: *What about intake and exhaust tuning? Do you take that into consideration when designing a cam?*

Norris: Because we design cams for engines that are already in production, we know we have certain parameters within which we can work. We keep pretty close track of all our cams, and if we find that a certain type of intake or exhaust system works well, we publish it along with the cam's specifications in our catalog. The only way to be really sure is to use a dynamometer. If it works on the dyno, it will work on the track. But actual track testing under racing conditions can further development. A subtle change to an intake or exhaust system can make a world of difference. ▣



1) A standard Triumph 650 cam. 2) Grooves are ground into the lobes to accept the hard facing. 3) A cam which has been hard-faced, and is ready for grinding. 4) The finished product.

1 *James Hess poses with his pride and joy. Not having the use of his legs doesn't keep him from enjoying motorcycling.*

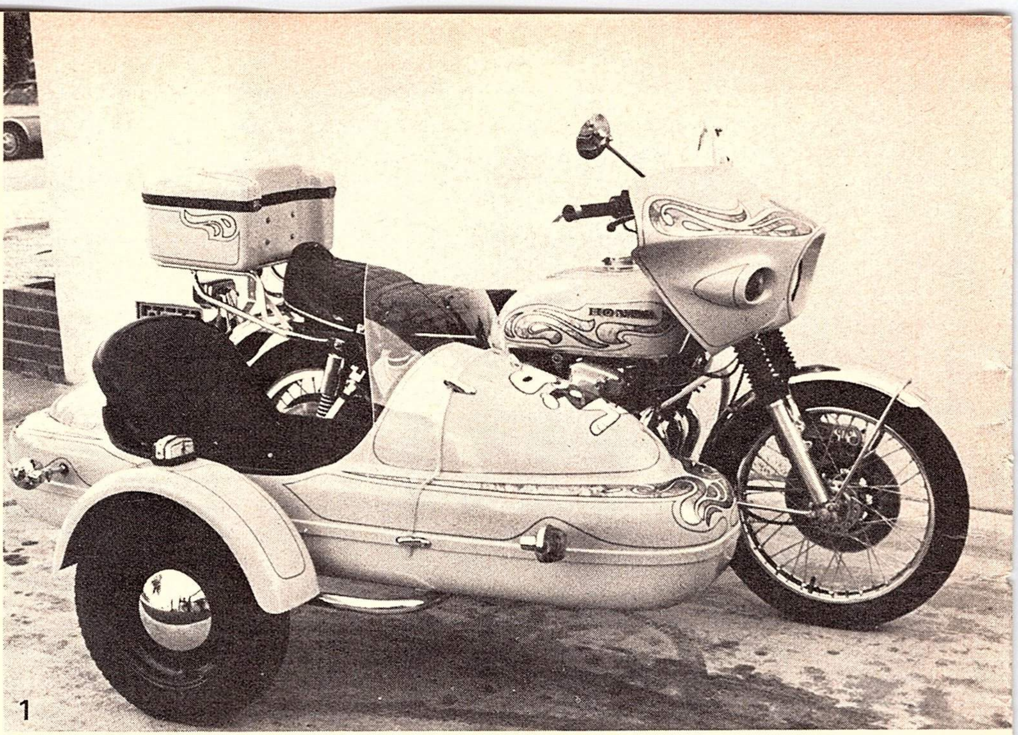
2 *Luggage box behind seat contains the relay box.*

3 *Servo-motor for gear changing is compact and fairly light, draws about 12 amps when in operation.*

4 *Tiny rod (see arrow) actuates a micro-switch to change gears automatically when clutch is withdrawn completely.*

5 *A Howard Barnes rear wheel/disc-brake assembly works perfectly. An Airheart caliper assembly is used.*

6 *The instrument panel looks like it came out of an airplane! Fine craftsmanship is apparent.*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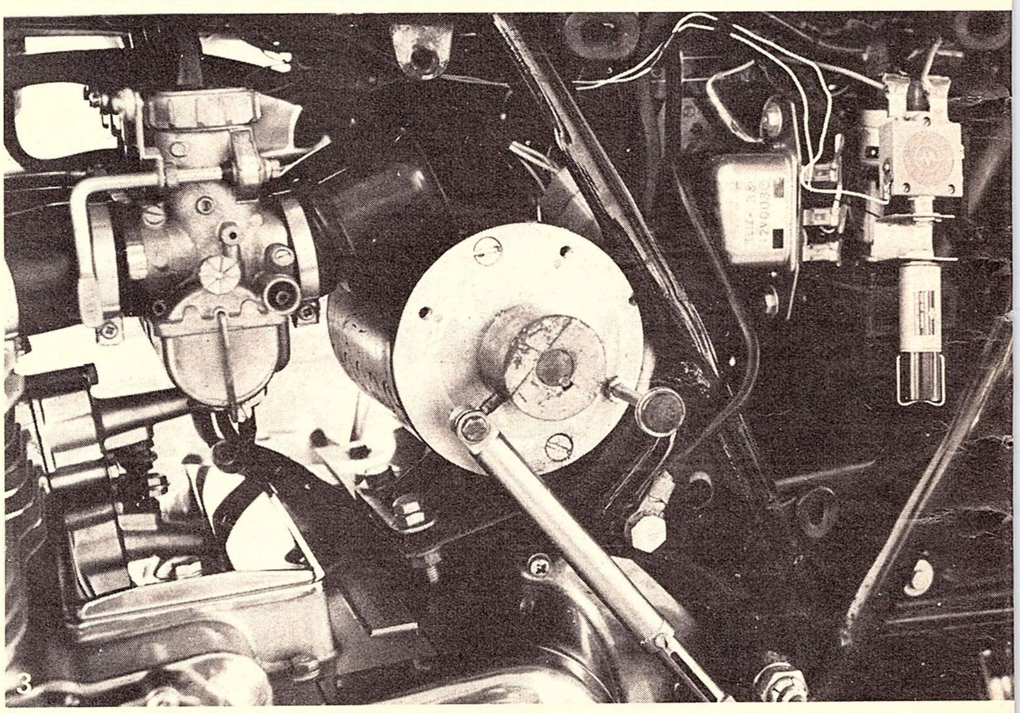
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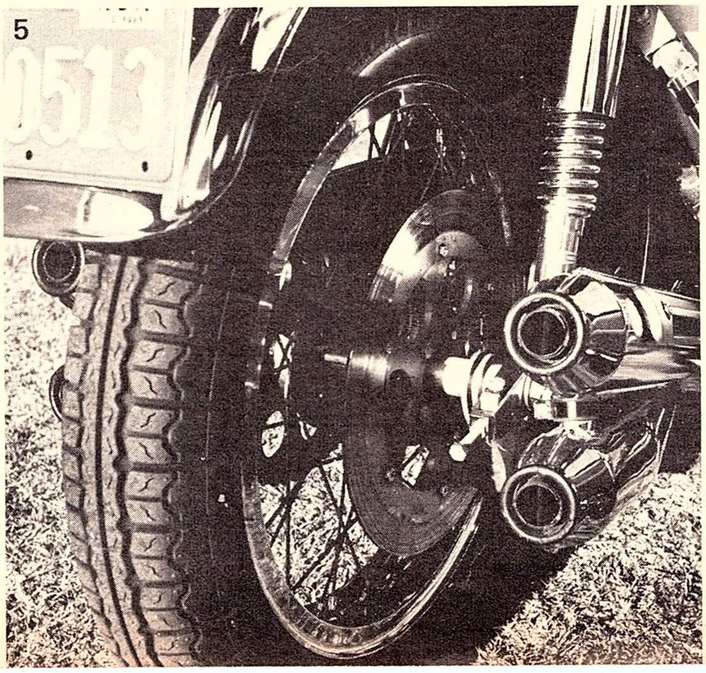
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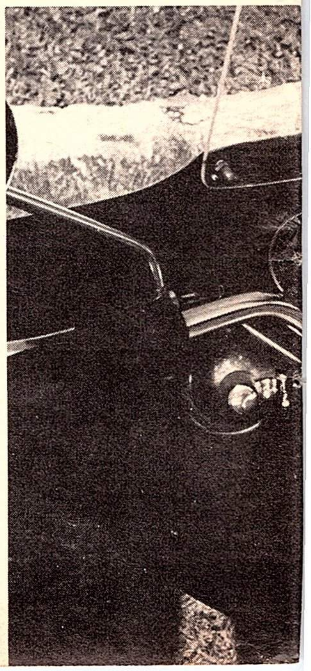

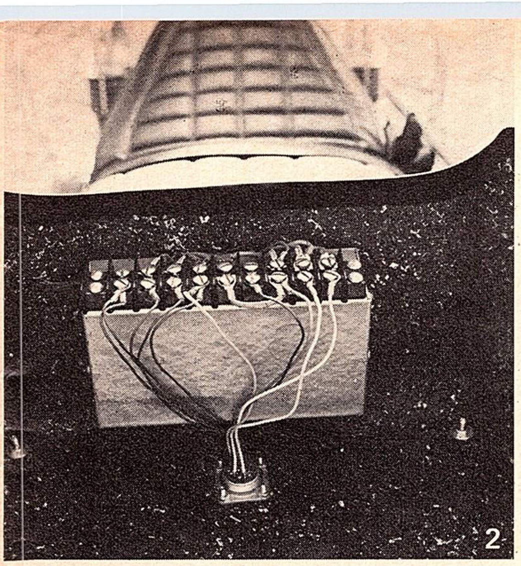

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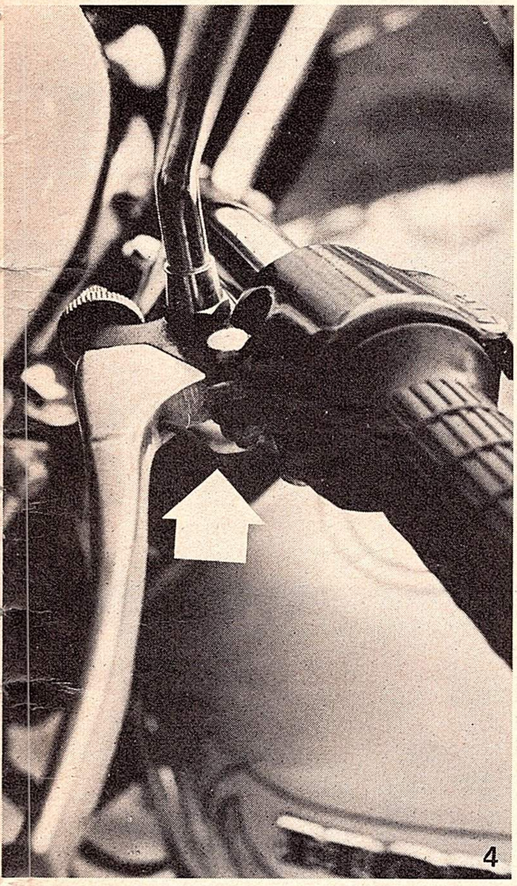

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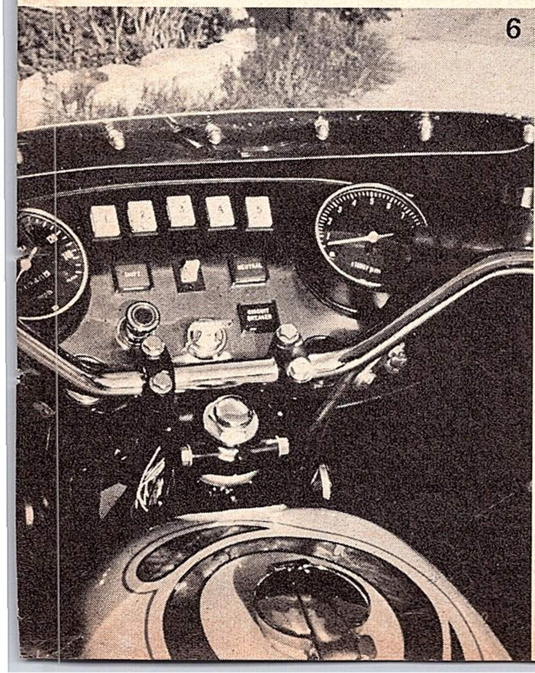

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Semi-Automatic Honda

Making A Motorcycle Fit The Man

WHEN JAMES HESS walked into Honda of Torrance on his crutches and announced that he wanted a CB750 he was met with incredulous stares and a few good-natured chuckles. James Hess is a paraplegic. But he was very serious.

Since James can't use his legs, a sidecar seemed the way to go. But being unable to use his legs posed a few problems. Shifting gears and braking.

First he chased down a suitable sidecar. Doug Bingham, of Sidestrider Inc., supplied a Bingham Mk I sidecar and helped James mount it properly. Without a passenger the sidecar was too light, so 80 lb. of lead were placed under the seat to add stability. Total weight of the sidecar and ballast is close to 200 lb.

The braking system also took some time to get sorted out. Howard Barnes, of Alloy Sprocket Specialties Inc., made up a rear wheel assembly using one of his reversible alloy hubs with the rear sprocket on the left and a disc and Airheart caliper unit on the right. The standard Honda master cylinder unit is retained, but a junction at the stoplight switch meters the brake fluid to give approximately 60 percent of the braking chores to the front disc and 40 percent to the rear. The sidecar wheel does not have a brake, but it isn't necessary.

The real masterpiece, however, is the gear shifting mechanism. Weeks were spent by James and Gary Oakes, his roommate, in finding a suitable servo-motor. Servo-motors are used extensively in aircraft to operate doors, control surfaces and hydraulic pumps, but they require large amounts of current, and some were too large to be installed on a motorcycle. Others either had insufficient torque or excessive current requirements.

Problems with shift linkage design were solved when the correct servo-motor was located in a surplus store. The motor is bolted securely on the top of the transmission and fitted with a circular disc to which an articulating rod is attached. The other end of the rod is bolted to the reversed shifter pedal.

Gary figured out all the wiring and began the task. He rewired the turn signal switch to set the direction of the servo-motor, and installed a micro-switch in the same housing. When the clutch lever is fully withdrawn, a small rod activates the micro-switch, which energizes the servo-motor; a shift is accomplished according to which way the button is set. Therefore, it is impossible to shift without the clutch except by using an override button on the dash.

Other items on the dash panel include five lights indicating which gear the machine is in, a neutral indicator, and a neutral switch which automatically selects neutral when depressed. This last item will be functional as soon as a new servo-motor is completed.

A master circuit breaker shuts off all electrical power if there is a malfunction in the electrical system, and a master switch turns on all the lights without turning on the ignition.

The luggage box behind the seat doubles as a housing for the relay box. All wiring is of computer grade materials, and the only maintenance required by the system is periodic disconnection of the shifting mechanism, allowing the motor to turn free and keep the contacts and brushes clean.

To top it all off, James had the bike painted a beautiful yellow over a red underbase, with custom pin striping by Bob Feinberg. Odd bits and pieces are chrome plated or highly polished, making the bike attractive as well as unusual.

A short ride in the sidecar provided Assistant Editor Jody Nicholas with a real thrill. James has become quite expert in operating his machine, which rides very well indeed. Once quite popular, the sidecar has fallen out of favor with motorcyclists, but we can't see why. They're loads of fun! ◘

Stripping A 650 Twin, Illustrated

THE NAKED BSA

BY MIKE CAPALITE

SINCE BSA SWITCHED their 500-cc and 650-cc Twins to the unit-construction-type engine, their popularity has grown quite a bit in this country. While some things have been made easier for the home mechanic, there are a few things that one finds when stripping one of these engines that could have been improved upon. All in all, it is a pretty sound engine, and although you have to take the transmission out when doing an engine strip, everything can be done on the bench where it is handier.

BSA has incorporated a few special tools, and while you can usually make do, it is best to have the right tool for removing the clutch hub and the pinion gear. If you are planning on doing an engine strip on your BSA, these tools are a good investment. When you take it apart, try to have enough bench room so you can lay out all the parts in order of disassembly. This makes it much easier when you put it together.

If you decide to do the job, here is a step by step teardown that may help keep your machine from becoming a basket case for your local dealer.

PHOTO 1

This is the BSA special puller that has an astronomical price tag. It is a handy set to have, but unless you are a professional mechanic, you need not acquire any but the puller and the jaws that are mounted in it in this photo.

PHOTO 2

Twelve Phillips screws secure the primary case (arrows). Note that two of them are painted red (circled). They also have washers behind them (on older machines, both the red paint and washers may be missing). The front one is an oil level check while the rear one is an oil drain. Both the primary and the transmission should be drained of oil before removing the engine from the frame.

PHOTO 3

Take away the three 3/16 Whitworth nuts holding the stator in position (arrows), but before attempting to remove it, thread the lead wires through the case so they may be removed with the stator. On the late models, the stator is encapsulated in resin. Do not mix these nuts with others from the machine, as they are special self-locking ones.

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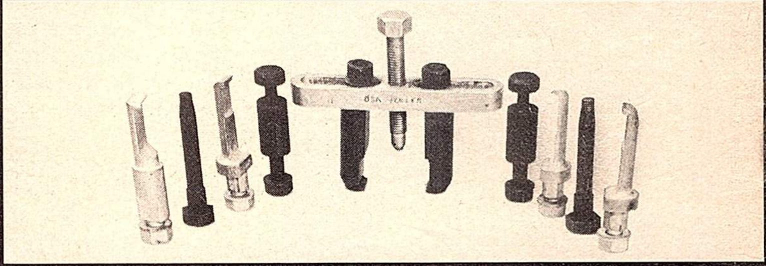

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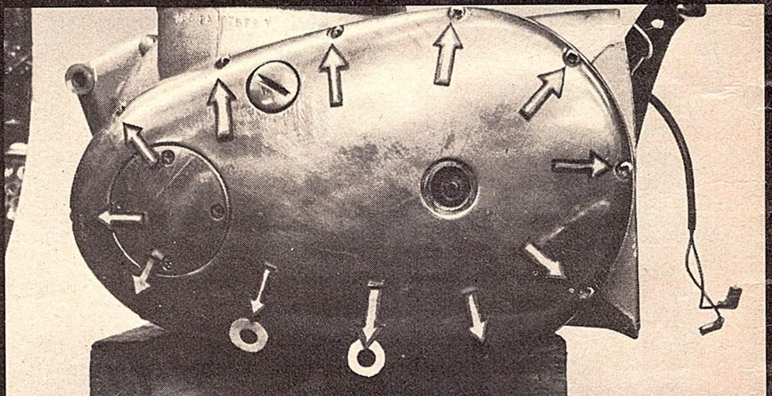

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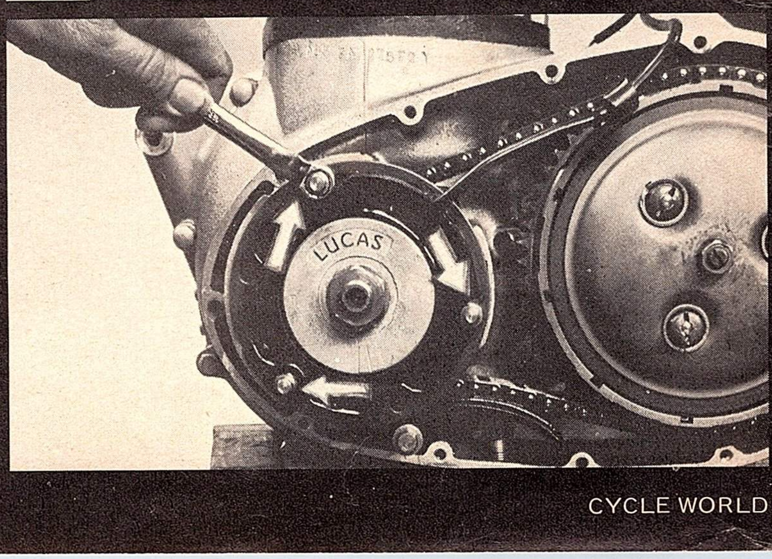

PHOTO 4

Bend down the locking tab on the 9/16 Whitworth crankshaft nut that holds the rotor in position and remove it. If the rotor is difficult to remove, use a puller. Never beat on it, even with a mallet.

PHOTO 5

Back off the primary chain tension adjuster located on the bottom of the case and remove the spacer collar and the adjuster shoe. Watch for this spacer when reassembling, as it is sometimes inadvertently forgotten.

PHOTO 6

Using a clutch adjustment tool, remove the clutch spring nuts. (For this job the best tool is one that was provided in some of the earlier tool kits.) If no tool is available, one can be made up from an old screwdriver. A beer can opener will work if the end is hacksawed off right through the center of the hole provided in one end to hang it up.

PHOTO 7

Using a 1/2 Whitworth socket, loosen the clutch hub nut. To keep the clutch hub from turning, either use the short section of chain affixed to a section of pipe on the countershaft sprocket with the transmission in gear, or weld an old driving plate to an old driven plate and insert it into the clutch hub and use the engine compression. Early models will have a locking tab on the nut while the later models use a self-locking nut.

PHOTO 8

Using the BSA clutch hub puller (part number 61-1912), break the clutch hub loose from the tapered main shaft and remove the complete clutch, chain and engine sprocket as a unit. Remove the Woodruff key from the mainshaft, and the oil seal spacer from the crankshaft behind the engine sprocket.

PHOTO 9

Remove the kickstarter lever and the shift lever and take out the three Phillips screws (arrows); this allows the removal of the outer timing side cover.

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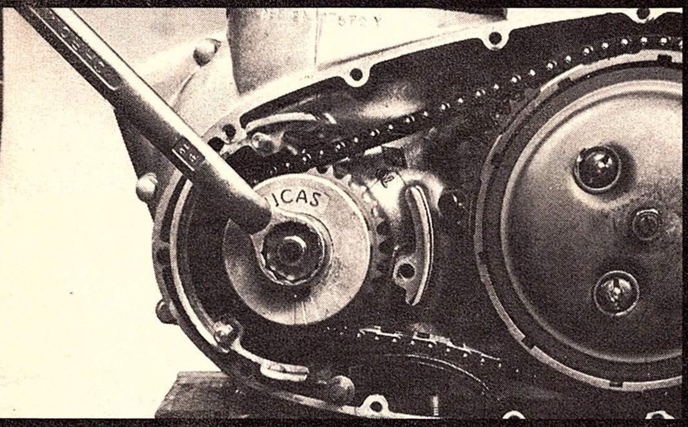

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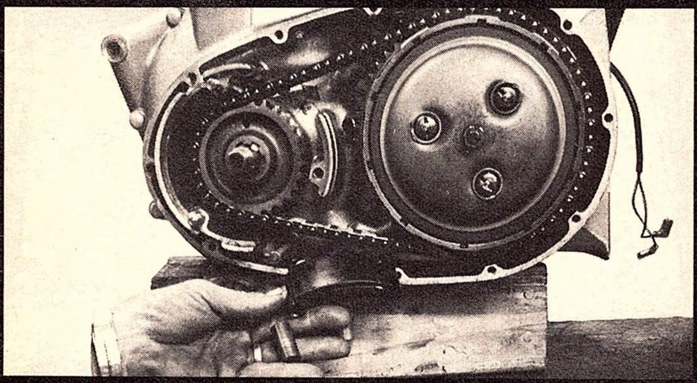

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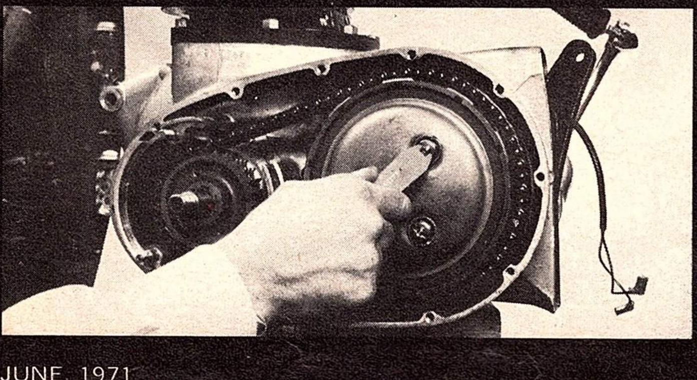

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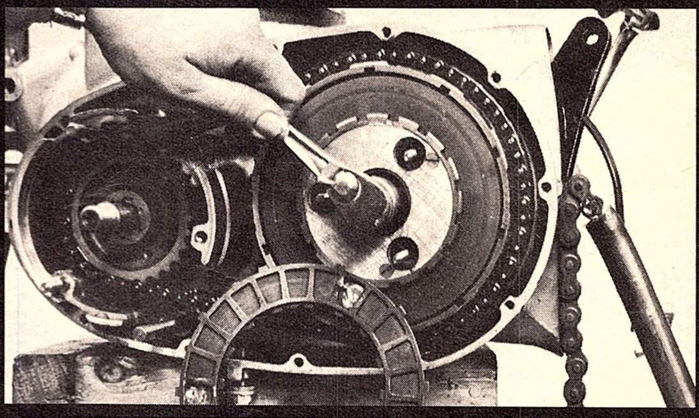

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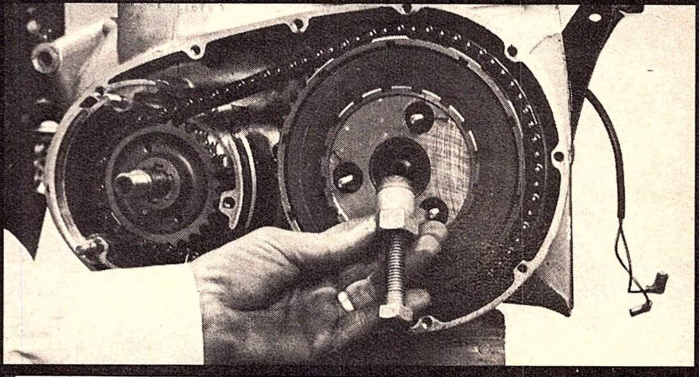

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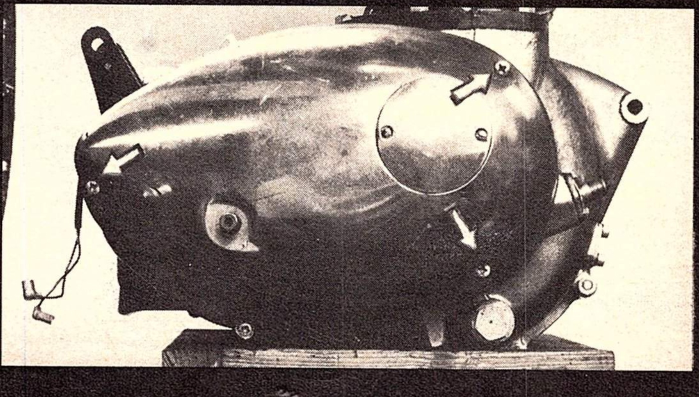

PHOTO 10

Use the correct size Allen wrench to loosen the lock screw and remove the shift return arm and spring. Remove the clutch rod push piece (arrow) to eliminate any chance of losing it.

PHOTO 11

The safest way to release the tension on the kickstarter spring for removal is to use channel-lock or similar large pliers to hook the large washer off the shaft.

PHOTO 12

Remove the point plate and lead wires by taking out the two small Phillips screws holding the plate in position. After removing the 3/16 bolt in the center of the point cam, a special tool is needed to break the auto-advance unit free from the taper. This unit can be loosened by tapping it with a soft mallet, but this is not recommended. Check the auto-advance unit to see that the springs are good and that it works freely.

PHOTO 13

Remove the two small bolts holding the tach drive unit after bending down the locking tabs (on some models this is safety wired). This unit *must* be removed before the inner cover can be removed.

PHOTO 14

Remove the 11 Phillips screws (arrows) and tap the cover with a soft mallet. If difficulty arises in removal, check to see that all the screws and the tach drive have been taken out.

PHOTO 15

Remove the kickstarter and gear shift shafts. If the transmission is to be worked on, remove the five nuts (arrows) and remove the entire transmission by tapping on the clutch end of the mainshaft with a hide hammer. The transmission need not be removed to split the engine cases.

THE NAKED BSA

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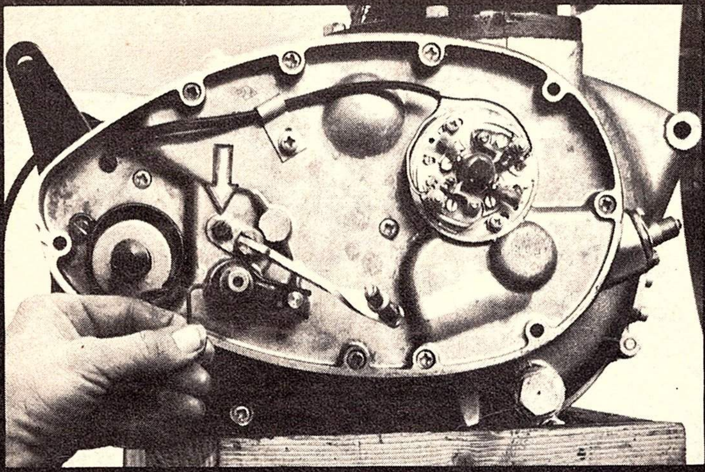

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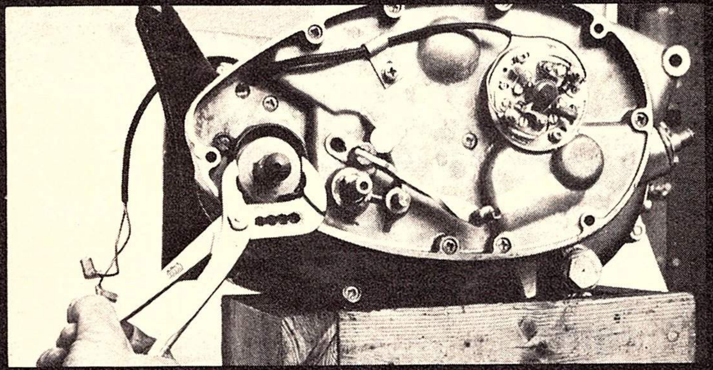

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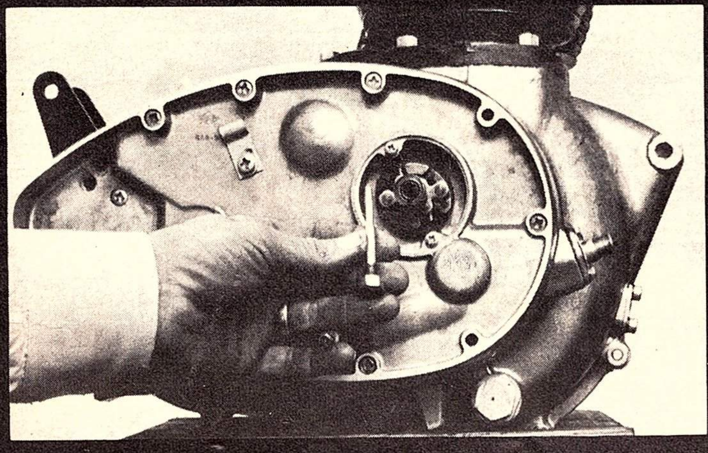

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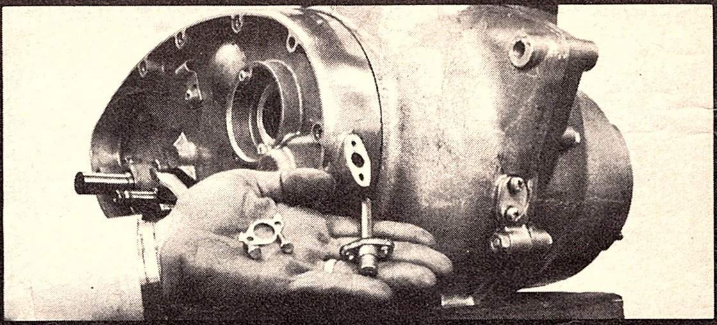

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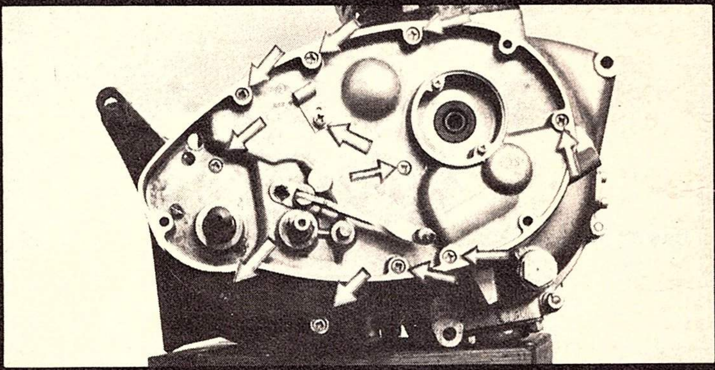

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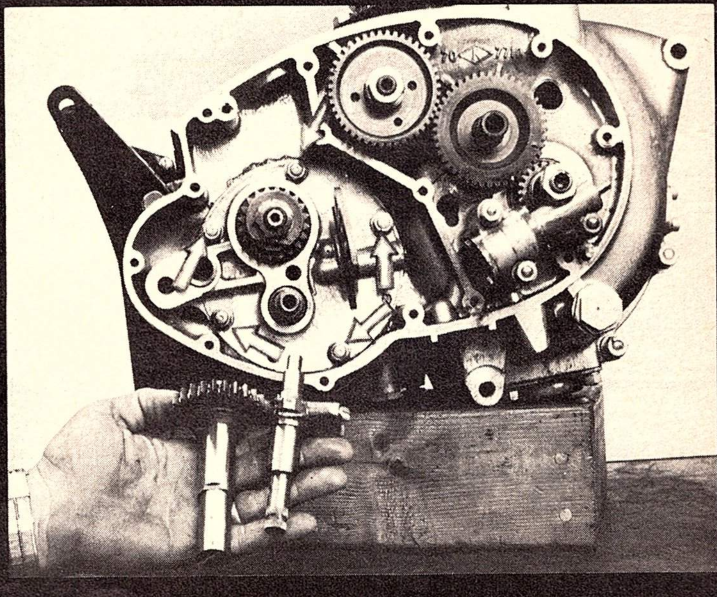

PHOTO 16

Here is the transmission as it comes from the case as a unit. The final drive gear remains in the case affixed to the countershaft sprocket. Be sure to remove the detent plunger and spring to avoid losing them.

PHOTO 17

If the cam gear is to be removed, bend down the locking tab and remove the nut before removing the idler gear so the engine compression may be used to keep the cam from turning.

PHOTO 18

The oil pump gear and locking nut must be removed before the oil pump is taken off, or damage to the oil pump drive will result. Lock nut and gear are *left-hand* thread.

PHOTO 19

Remove the three nuts (arrows) and take off the oil pump, being sure not to lose the ball check and spring. When replacing, the spring goes into the case and the ball is greased and stuck into position on the pump.

PHOTO 20

If the cylinder head has not been removed, position the engine at bottom dead center by positioning the keyway (arrow) at the bottom before moving any of the valve train gears. Do not rotate the engine again until the head has been removed, or you risk fouling the valves against the pistons.

PHOTO 21

Install the correct jaws on the puller and remove the pinion gear. (Small flats are ground into the pinion gear to accept this puller.) Then remove the Woodruff key from the shaft and remove the idler gear.

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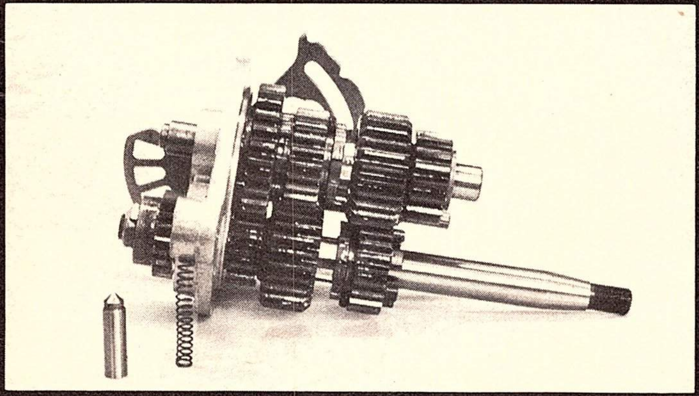

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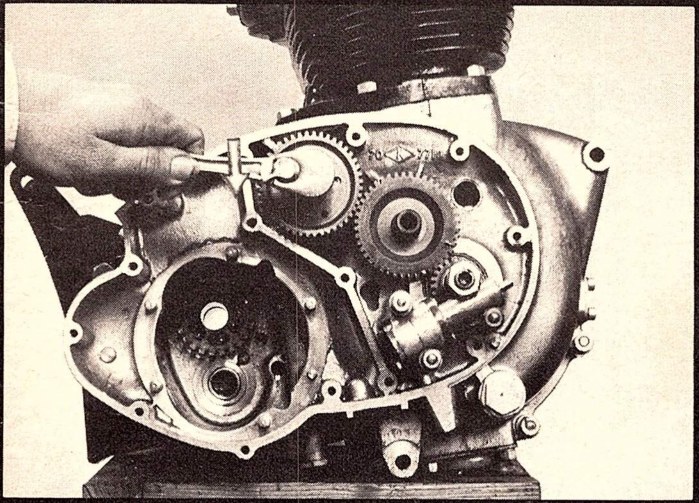

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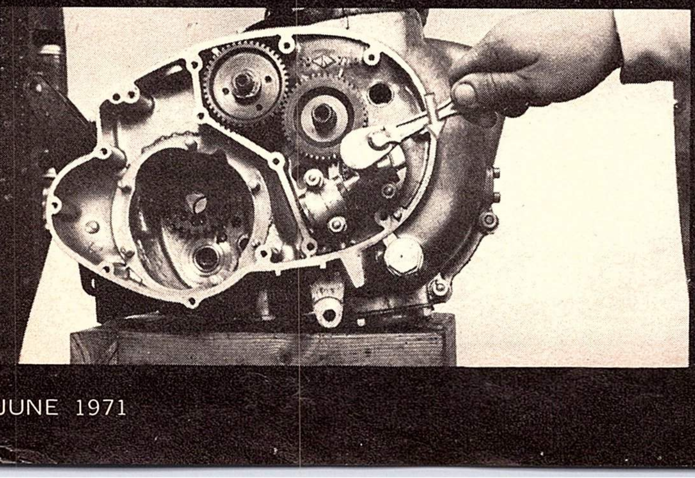

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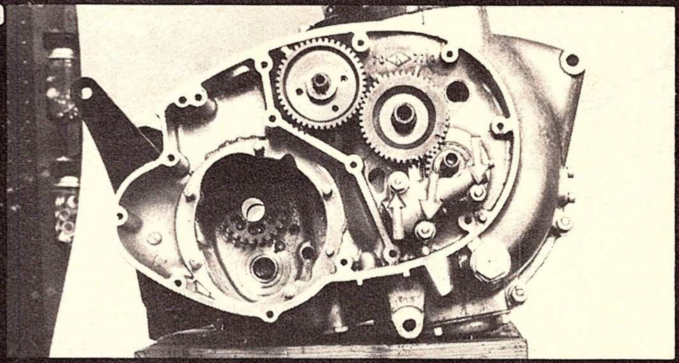

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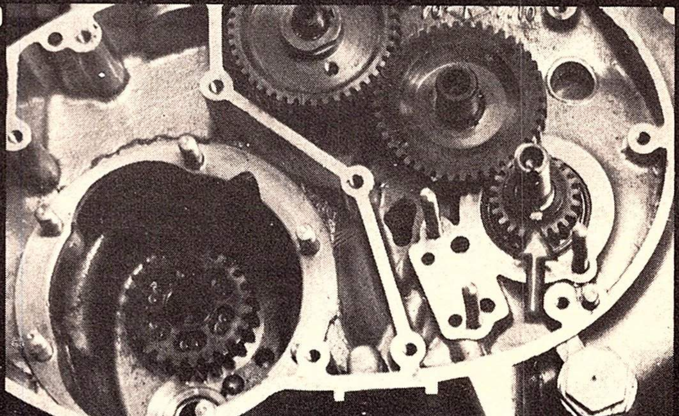

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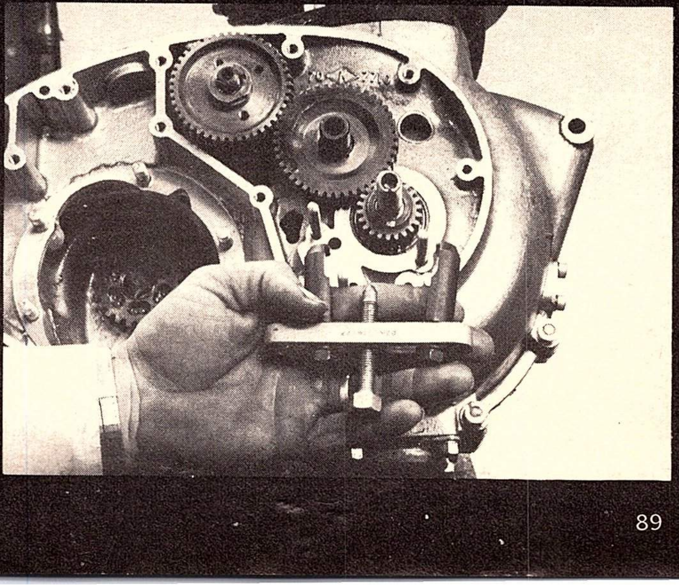

PHOTO 22

Change jaws on the puller for the threaded bolts to remove the cam gear, and take the Woodruff key out of the shaft. If there is no need to remove the cam, it may remain in the case during disassembly and reassembly.

PHOTO 23

Go to the top of the engine and remove the rocker box cover by taking off the six nuts (arrows). Note that the front and rear center nuts are dome nuts and must be replaced in this position when reassembling.

PHOTO 24

Making sure that the engine is still at bottom dead center, lever down the rocker arms and remove the pushrods. Remove the pushrods from the valves that are open first to avoid fouling one valve against another.

PHOTO 25

When removing rocker arms and shafts, reassemble them as you had removed them, noting the relative positions of the springs and washers. The intake rocker arm assembly need not be removed, but the exhaust must be to get at the two head bolts beneath it.

PHOTO 26

Remove the nine head bolts and nuts (arrows) in opposite order of the tightening sequence (numbers on the arrows). Do not forget the center bolt which sits further down the head and is hidden by the pushrods when they are in position; it can often be overlooked.

PHOTO 27

Remove the eight nuts at the base of the cylinder and position the pistons at top dead center. Lift the cylinder slightly and stuff clean rags into the crankcase before removing the cylinder completely to avoid damage to the connecting rods from striking the crankcase.

THE NAKED BSA

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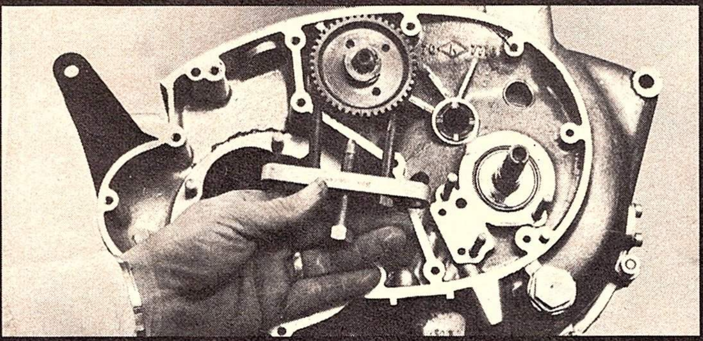

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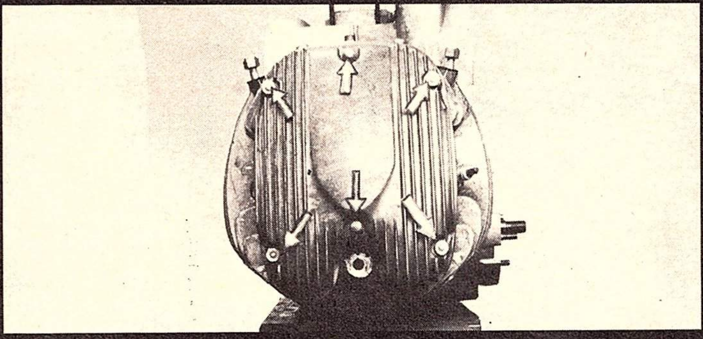

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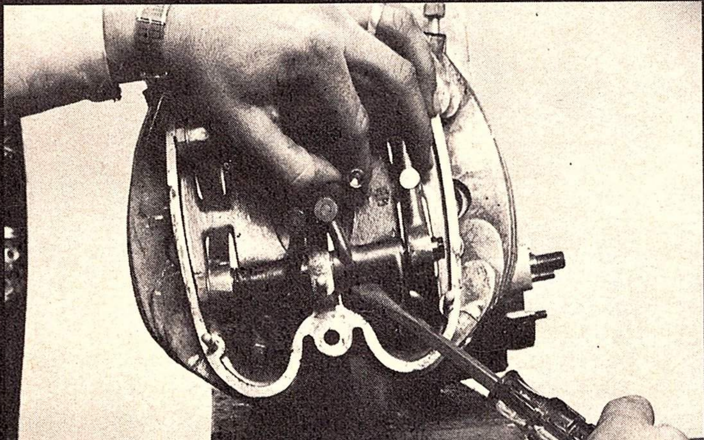

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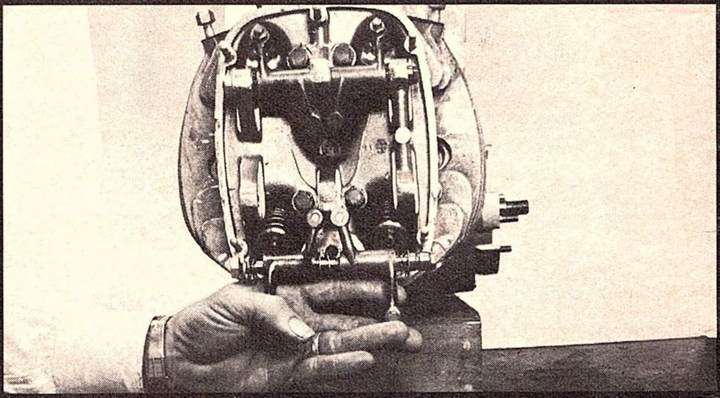

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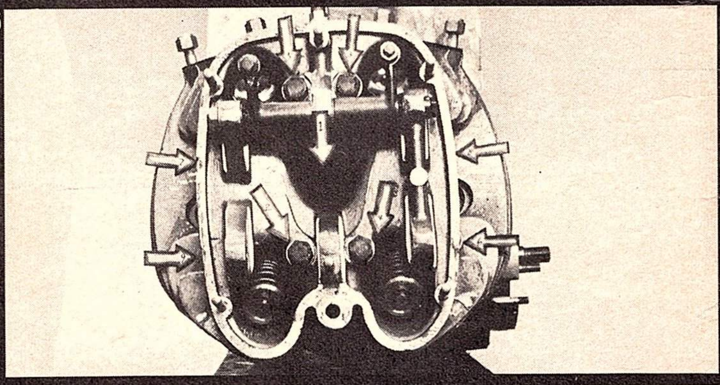

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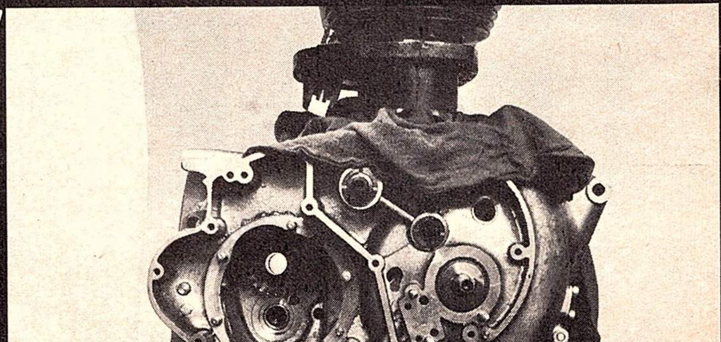

PHOTO 28

With the crankcase still covered, remove the outboard circlips from the pistons with a small screwdriver. Heat the pistons and push out the piston pins. Mark the pistons with a marking pen so they can be reinstalled exactly as removed.

PHOTO 29

Remove the sump plate from the bottom of the engine. Eight nuts and bolts (arrows) hold the cases together. Take note of the top arrow pointing to the nut inside the crankcase opening, which is hidden when the cylinder is placed in position.

PHOTO 30

Tap the primary side with a hide hammer to break it loose, and remove it. Grasp the crank firmly and lift it straight up and away.

PHOTO 31

Remove the crankcase breather valve and spring from the primary side. Take great care in reassembly so that the drive tangs on the valve are in position with the drive slots in the end of the cam.

PHOTO 32

Remove the crankshaft thrust washer and the cam from the timing side case. If the final drive gear is to be removed from the transmission, the countershaft sprocket must be removed, as it holds this gear in position.

PHOTO 33

Before removing the rods from the crankshaft, note the matching numbers stamped on each rod and end cap. These must be adjacent when the rods are installed back on the crank. Also mark the rods for timing and drive side and front and rear so they may be assembled just as they were removed. Now for that great space-saving line that is so predominant in service manuals: "assemble in reverse order." ◘

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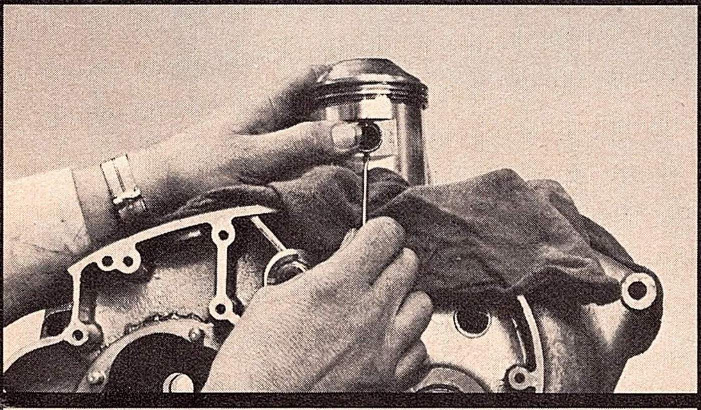

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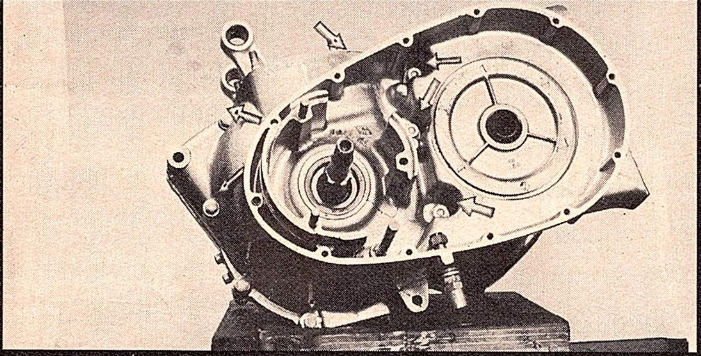

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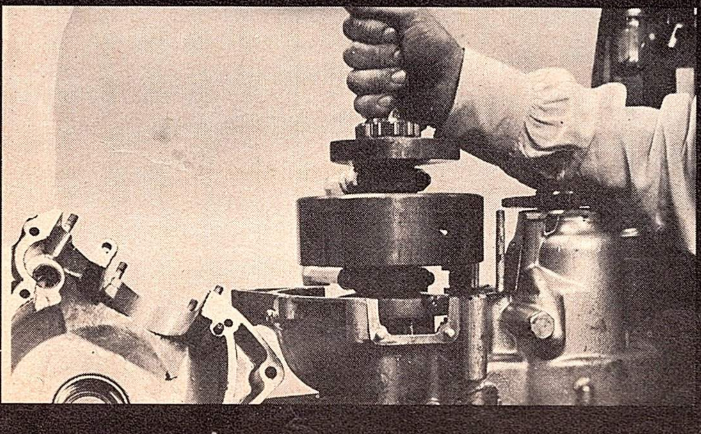

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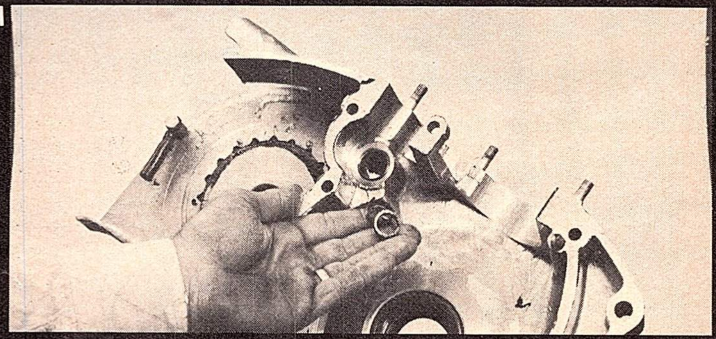

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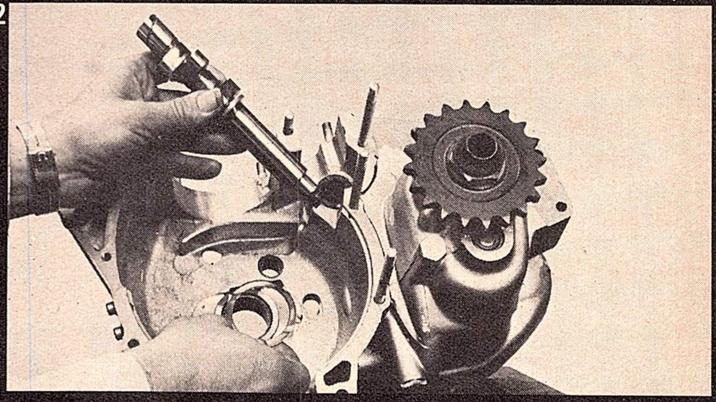

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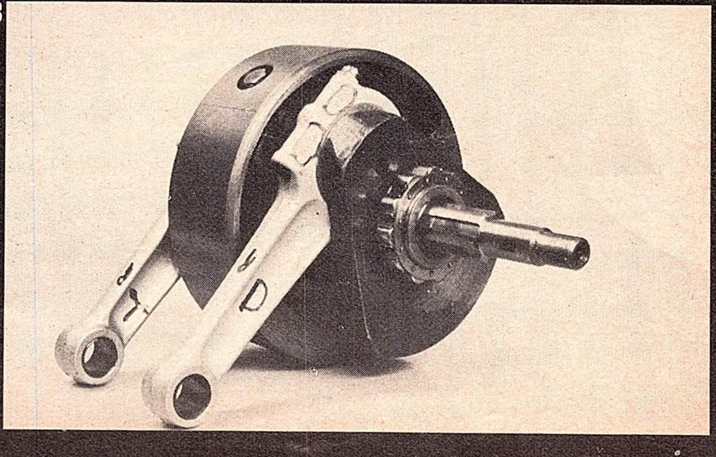


Zweitakt Motorrad Museum

...For Two-Stroke Lovers Only

BY RICHARD C. RENSTROM

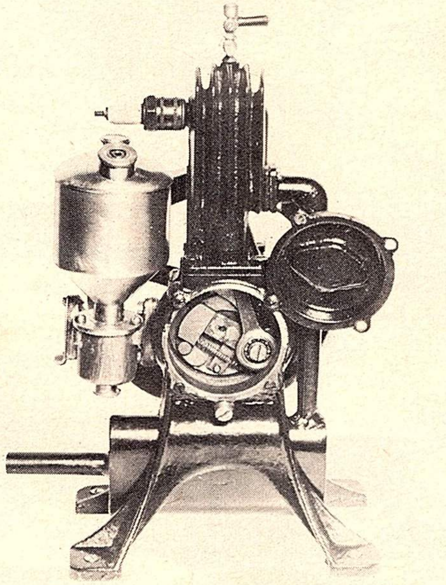
ONE OF THE WORLD'S unique museums, housed in a quaint old sixteenth century castle, is located at Augustusburg, in East Germany, behind the "iron curtain." The area, called Erzgebirge, which means the ore mountains, is a beautiful setting with a deep green forest, alpine meadows and tall mountains.

The Museum is dedicated exclusively to the two-stroke motorcycle, thus the name of Zweitakt Motorrad Museum. Its portrayal of the invention and development of the two-stroke motorcycle is probably unique in that it is the only museum in the world devoted solely to the two-stroke.

The man who first thought up the idea for such a museum is Ing. R. Hiller, a friendly gentleman who was a service representative for the famous MZ concern for many years. Ing. Hiller began by restoring a few old bikes for himself, but soon got the go-ahead from MZ to start an official company museum. This was all the encouragement Hiller needed. Immediately, he began looking about for a suitable building to house his beloved old two-strokes.

The MZ company is located in Zschopau, in East Germany. This also happens to be the home of the pre-war DKW factory, one of the greatest names in the history of two-stroke motorcycles. Wanting to remain in the same general area, Hiller finally settled on the old castle at Augustusburg.

The castle itself was constructed in the classical Renaissance architecture so popular then. Originally, the castle was intended to be a hunting resort for a wealthy baron, but today it is used by the state as a tourist attraction. The Zweitakt Museum occupies only a few rooms in the castle, but the total setting is extremely impressive and memorable. The rest of the castle is devoted to cultural and historical displays.



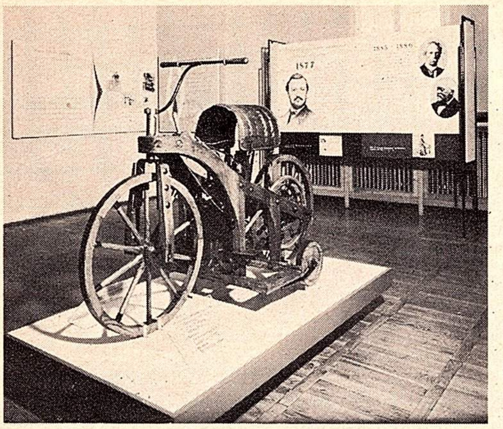
This crude looking device is the first DKW two-stroke engine. Many engine displays and large wall posters reveal the mechanical features of two-stroke engines over the years.

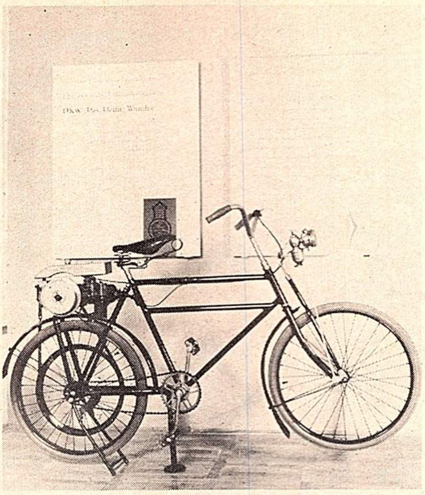
Hiller began setting up his museum in 1961 with the goal in mind of displaying a series of engines, machines, charts, graphs, photographs, and technical data that would show the viewer the total evolution and history of the two-stroke motorcycle.

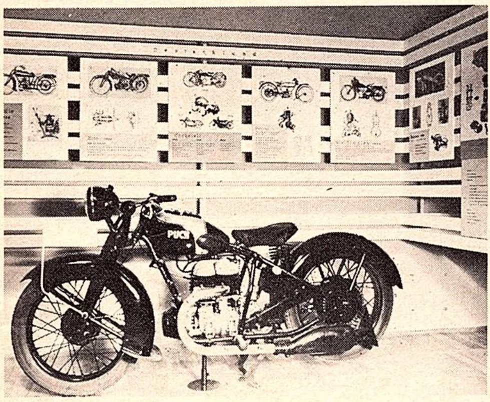
Today, Hiller has dozens of bikes from the very earliest antiques to the very latest works racers, and he has also acquired a library of historical and technical information that is unequaled. The result is impressive and totally professional.

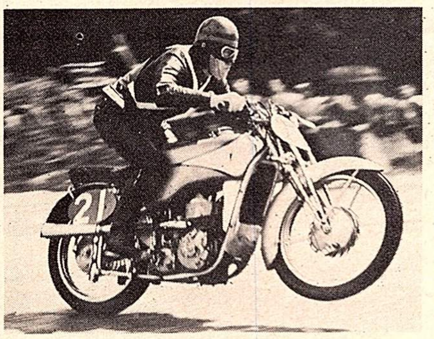
If you were to visit this colorful museum, you would begin by viewing the world's first motorcycle, the invention of Germany's Gottlieb Daimler. This contraption, built in 1885, featured a single-cylinder four-stroke engine that turned over at 600 rpm. Top speed was 7 mph. The frame and wheels were made of hickory wood, and a belt drive was used to transmit the power. The Zweitakt model is actually a replica of Daimler's bike, the original being in the Daimler-Benz Museum in Stuttgart, Germany.

There were, of course, many important inventions leading up to Daimler's bike, such as a steam powered bicycle in 1817 and the first internal combustion engine by the French inventor, J. Lenoir, in 1860. Then came the four-stroke design of Dr. N.A. Otto in 1876, followed by the two-stroke design of England's Sir Dugald Clerk in 1881.









Top left:
A replica of the first motorcycle in the world is on display in the museum. Gottlieb Daimler built this contraption in 1885. The frame is hickory wood.

Top right:
The first DKW was produced in 1919 with a 119-cc engine mounted over the rear fender. The 1.5 bhp engine needed pedals for starting and on hills.

Bottom left:
An unusual bike on display is this 1931 Puch with its 500-cc twin-cylinder engine that has a crankshaft in line with the frame. The Austrian bike had its gearbox in the rear hub.

Bottom right:
The 1939 DKW 250- and 350-cc water-cooled split-Singles were the terror of the grand prix with their 111 and 122 mph speeds. The blown rotary valve models were also known for their noise. Sigfried Wunsche is shown here in full flight in the TT.

These early inventions are all depicted by wall charts, giving an orderly progression through the years.

Next is the world's first motorcycle produced for sale—the Hildebrand and Wolfmueller. This German concern produced an opposed twin-cylinder water-cooled four-stroke engine that displaced 1487cc. The con rods worked directly on the rear wheel. The engine was mounted centrally, and top speed was an astounding 28 mph. These primitive motorbikes were produced from 1894 to 1897.

During these early years the two-stroke engine was developed along with the four-stroke, with the British, French and Belgians leading the way. In 1912 and 1913, Scott two-strokes won the Isle of Man TT, but thereafter side-valve engines became too fast and reliable for the two-stroke to remain competitive. By the early 1920s the ohv design with a hemispherical combustion chamber was showing terrific speed and exceptional reliability. Two-strokes slipped away to being used only for "utility" lightweights.

The next significant step came in 1919 when the famous DKW concern was founded in Zschopau. This company dedicated itself to the development of the two-stroke, and for the next 40 years they were to lead the way in showing the world the advantages of the two-stroke design.

Also on display is a beautifully restored 1919-1923 DKW motor-bicycle, which had a 122-cc engine mounted above the rear wheel. Power output was 1.5 bhp, and a straight belt drive was used in conjunction with pedals to be used on hills and for starting.

The next display features several rare bikes, such as a 1921 Golem (Germany) that must certainly be the world's first motorscooter. There is a 1922 Lomos-Sesselrad, a primitive belt driven rig that few have ever heard of. A slightly more modern looking bike is the 1921 Stock (German), which used an American 119-cc Evans engine that produced 1.5 bhp at 3200 rpm.

During the middle 1920s several improved two-strokes made their debut. These sported heavier frames, two- and even three-speed gearboxes, chain drives and more spirited performance. The 1925 DKW 200 displayed still used a belt drive, while the more modern looking 1927 Dunelt (British) featured chain drive and a "saddle" fuel tank that went over instead of between the top frame tubes. All of these models are accompanied by large posters containing technical details and drawings.

In spite of these improvements, the two-stroke fell to the lowest ebb in its history during the late 1920s and early 1930s. In grand prix racing the only model capable of giving a respectable performance was the 250-cc Puch, which was water cooled and used a piston-type supercharger. In the roadster field the two-stroke was used mostly for inexpensive "utility" lightweights that rated very low on the popularity list.

The problems then were spark plugs fouling and pistons freezing up. This was caused by the use of a raised deflector on the piston crown, employed in an effort to keep the incoming fuel charge from traveling straight out the exhaust port. The uneven shape of the piston crown caused the piston to distort as it heated up, resulting in piston seizure. The only answer was to provide excessive piston clearance, which resulted in a loss of crankcase pumping efficiency and a subsequent loss of performance. In addition, the poor engine breathing resulted in fouled spark plugs. Two-strokes were definitely an inferior proposition.

DKW had been battling this problem in their 175- and 250-cc racing engines since 1925 with little success. Their supercharged 250 churned out 15 bhp at 4000 rpm then, but the blinding speed was invariably followed by piston seizure.

The man who solved this thorny problem was Dr. Schnurle. In 1934, he invented the now famous loop scavenging design in which the piston crown was flat and two transfer ports were located near the front of the cylinder and inclined upwards. The fuel charge thus traveled across the piston, up the back side of the cylinder wall, and then

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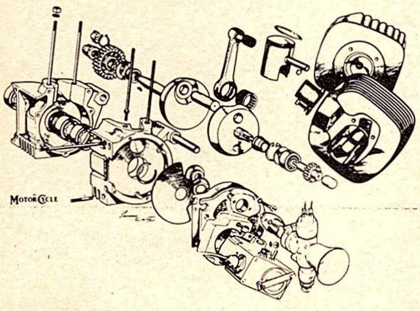

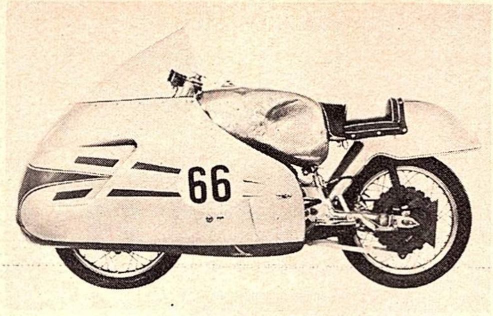

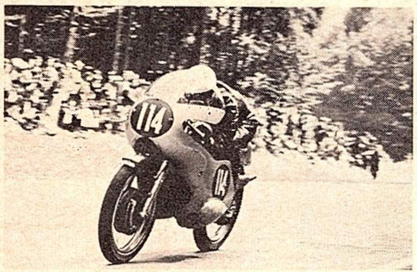

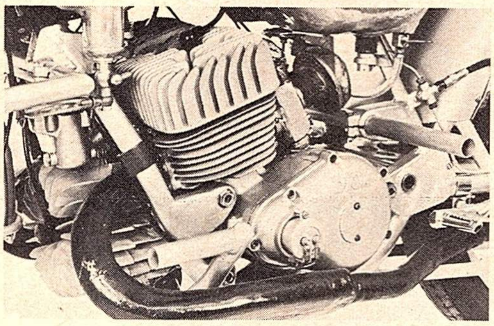

Top left:
Walter Kaaden was the man who developed this 125-cc rotary valve MZ Single in the late 1950s. An expansion box exhaust system was also used.

Top right:
The 1955 DKW 350-cc Three was capable of 140 mph with its "dustbin" fairing. The DKW had unusual front and rear hydraulically coupled brakes operated from the rear foot pedal.

Bottom left:
During the late 1950s MZ staggered the experts with their fast two-stroke 125s. Ernst Degner is shown flat-out here. The marque has won many races but never the championship.

Bottom right:
The DKW Three had piston controlled ports and an early expansion box exhaust. The engine pumped out 45 bhp at 9700 rpm. An electric cut-out was used for shifting the six-speed box that required only a touch of a button and a dab on the gearshift lever.

Zweitakt *Continued*

looped over the top of the combustion chamber and out the bottom exhaust port.

This new system had the advantages of the fresh fuel charge cooling the piston, a better piston shape for less distortion, less loss of fuel out the exhaust port, and less carbon deposit on the spark plug and ports. DKW thus found they could run a closer piston clearance, which in turn maintained the crankcase pumping efficiency. Reliability was greatly improved.

This loop scavenging principle is, without any doubt, the most important innovation in the history of the two-stroke, and it put DKW into the racing business with a bang. They were fabulously successful and were responsible for improved roadster design.

During the 1930s DKW raced a 250 that won the European Championship in 1935, 37, 38, and 39. These German models were unique, featuring a split-single design in which two pistons mounted on articulated connecting rods worked on one combustion chamber. The transfer ports opened into one cylinder and the exhaust ports were in the other cylinder. Water cooling was used as was a reed valve. Output was 25 bhp at 4400 rpm. The large compressor piston was horizontally mounted at the front of the crankcase.

In 1936 the engine was modified to a piston type compressor and rotary inlet valve, which allowed crankcase charging to occur when it would do the most good. In 1939 the design was again changed to an eccentric vane blower, which raised the output to 40 bhp in the 250, and 56 bhp in the 350. Top speeds were 111 and 122 mph respectively, but the machines weighed 400 lb.

Then came World War II and racing was put aside. After the war, racing resumed, but a new FIM formula prohibited superchargers. DKW accepted the challenge and began designing new engines using a perfected loop scavenging method. By 1953 they had a fast 125-cc Single, and by 1955 their 350-cc Three was churning out 45 bhp at 9700 rpm—good enough for a cool 140-mph top end when used with full streamlining.

This DKW was rather unusual with its two vertical cylinders and one horizontal cylinder. The idea was to get a narrower engine than a transverse in-line Three. DKW dropped rotary valves and went back to piston-port control of the crankcase charging, due perhaps to the extra bulk required to house three rotary valves.

The following year the DKW works lost interest in racing. It was left to Walter Kaaden at the East German MZ factory to carry on the work. Kaaden can truly be called the "father" of contemporary two-stroke technology for putting the two-stroke in the winner's circle.

The first thing Kaaden did was to design a rotary disc inlet valve which allowed him to time the crankcase charging independently from the stroke of the engine. With a conventional piston-port engine the port opening and closing is symmetrical, opening the same number of degrees before top dead center as it closes past top dead center.

This, of course, is not the most desirable feature, since the crankcase vacuum is at its peak earlier in the stroke. By using a rotary inlet valve it is possible to time the inlet charge asymmetrically and, therefore, take advantage of the greater duration of crankcase depression to get the maximum fuel charge possible.

Kaaden found, for instance, that he could open the inlet port 154 degrees before TDC and close it at 58.5 degrees after TDC—a duration of 212.5 degrees. About the best that can be had with a piston-port engine is 160 degrees, so a definite performance gain is available with the rotary valve. We might mention here that the only reason the inlet port can be held open on either engine after TDC is because the incoming charge of fuel has so much momentum that it will keep ramming in after the piston begins its downward travel and the crankcase compression is increasing.

The next Kaaden idea was the expansion box exhaust system that DKW had played around with on their Three. The idea is that the exhaust gas has great momentum as well as sound waves while traveling out the pipe. This will cause a depression in the combustion chamber if properly harnessed, which in turn will help pull the incoming charge of fuel from the crankcase. This fuel charge has a tendency to travel right on out the exhaust port, though, so the pipe is designed to reflect a positive pressure wave back up the pipe late in the cycle which will pop the charge back into the combustion chamber.

The third idea Kaaden perfected was the third transfer port in the skirt of the piston. Originally it was thought that it helped lubricate the wrist pin bearing, but the extra port was found to provide a substantial boost in power as well as

(Continued on page 112)

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CONTINENTAL REPORT

BY B.R. NICHOLLS

NEW RIDERS FOR AJS, BULTACO

Vic Eastwood is the latest motocross man to join the AJS factory and will assume the role of development engineer and rider of the works 250- and 410-cc scramblers. He joins the Swedish rider Bengt-Arne Bonn who will contest the world series in the 250 class. Eastwood will, in some measure, replace Malcolm Davis, who has signed for the Spanish Bultaco factory now that they are showing renewed interest in the motocross scene. A Bultaco man in 1966 and '67, Davis' victory in the 1970 250 British championship gives him certain entry to the 1971 world title series, which he will contest for Bultaco. His 1971 debut, however, on a Pursang model was not very inspiring when he finished 5th at a television meeting. It is a result that should be forgotten though; Davis will soon have a brand new lightened and more powerful model to take title chasing.

TELEVISED MEET

That television meeting was to have been a great international event but a four-week-old postal strike and subsequent breakdown in communication meant that the only Swedish rider present was Bengt-Arne Bonn, who lives here anyway. Fortunately, the Suzuki trio of Joel Robert, Sylvain Geboers and Roger DeCoster were present to challenge the home riders. They did not fare too well, though, on a slippery and muddy course that favored the four-stroke BSAs swamping the board.

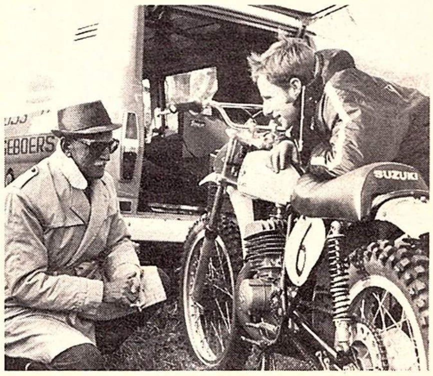
The first race was an invitation 500cc. Bryan Wade set the pace on his Husqvarna, but he was pipped at the post by John Banks (BSA), whose teammate Dave Nicoll did the same thing to Geboers in a battle for 3rd place.

The big event of the meeting was a two-leg motocross for the Norton Villiers trophy, who was sponsoring the racing. In the first race lanky Dave Nicoll, a firm convert to a Bell helmet after his American tour, took the lead, which he lost to Wade after a fall with Andy Roberton (BSA), taking 2nd. Wade continued in the lead until three quarter distance, when he fell on an adverse camber hairpin at the bottom of a hill. This particular spot caused a lot of trouble with riders slithering around and having to pull away uphill virtually from a standstill; it was ideally suited to the BSA characteristics.

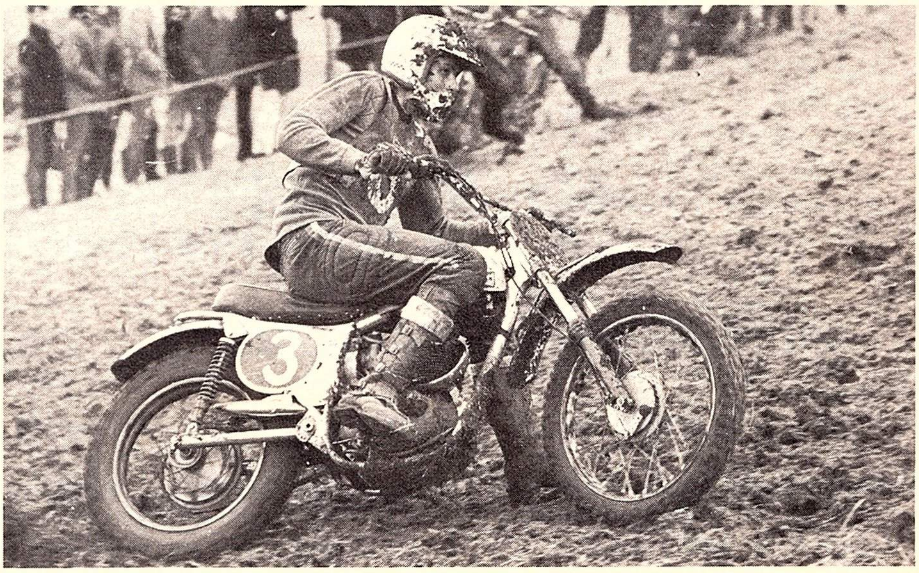
With Wade out, Banks took the lead. He held it to the finish, but Roberton lost 2nd place on the final bend, when he fell. Nicoll then took 2nd, though Roberton remounted to take 3rd, ahead of Geboers and Robert.

In the second race Andy Lee (BSA

(Continued on page 98)



Renewed Bultaco interest in motocross? Senor Francesco Bulto talks with Sylvain Geboers at a recent British TV meet.



Dave Nicoll (BSA) on his way to a televised meet win.

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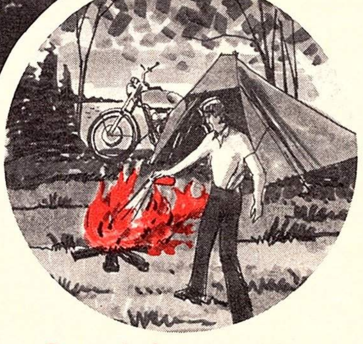

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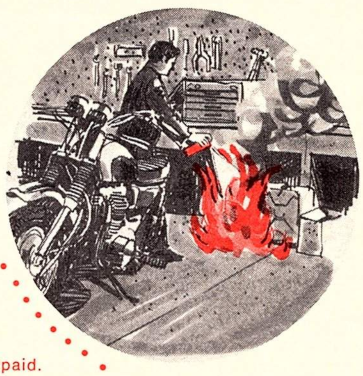

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Cont. Report

Continued from page 96

Roger DeCoster scores his first international victory on the 250 Suzuki.

Metisse) had a brief moment of glory leading for the first lap. But then he collided with Roberton and found at the bottom of the next hill that he had lost his rear break lever in the collision—exit crowd very quickly!

By then Wade had taken the lead, but he was in turn ousted by Roberton. Wade then slid to earth. It was all good viewing stuff, especially as Nicoll and Banks then whistled past Roberton, who went right down to 5th in the end when both Vic Eastwood, riding Husqvarna for the last time, and Robert passed him. Nicoll held off Banks, and was declared the overall winner by less than a second from Banks.

DeCoster had his moment of glory in the final race of the day for 250 machines when he led from start to finish from Geboers. Bonn placed 3rd and Davis 4th on the Bultaco.

TV DEBUT FOR VIC ALLEN/BSA

A week later we had another television meeting on the commercial channel that had taken place two weeks earlier; that, no doubt, sounds very Irish. It is easy to explain, as the company thought the moon walk was the highlight of that Saturday afternoon. Consequently, they recorded racing for later viewing.

The meeting marked the debut for Vic Allan on the works BSA. The Scottish ace beat his team leader John Banks in the Allcomers final, to win first time out on the new machine.

It was a day of surprises. In the

(Continued on page 100)

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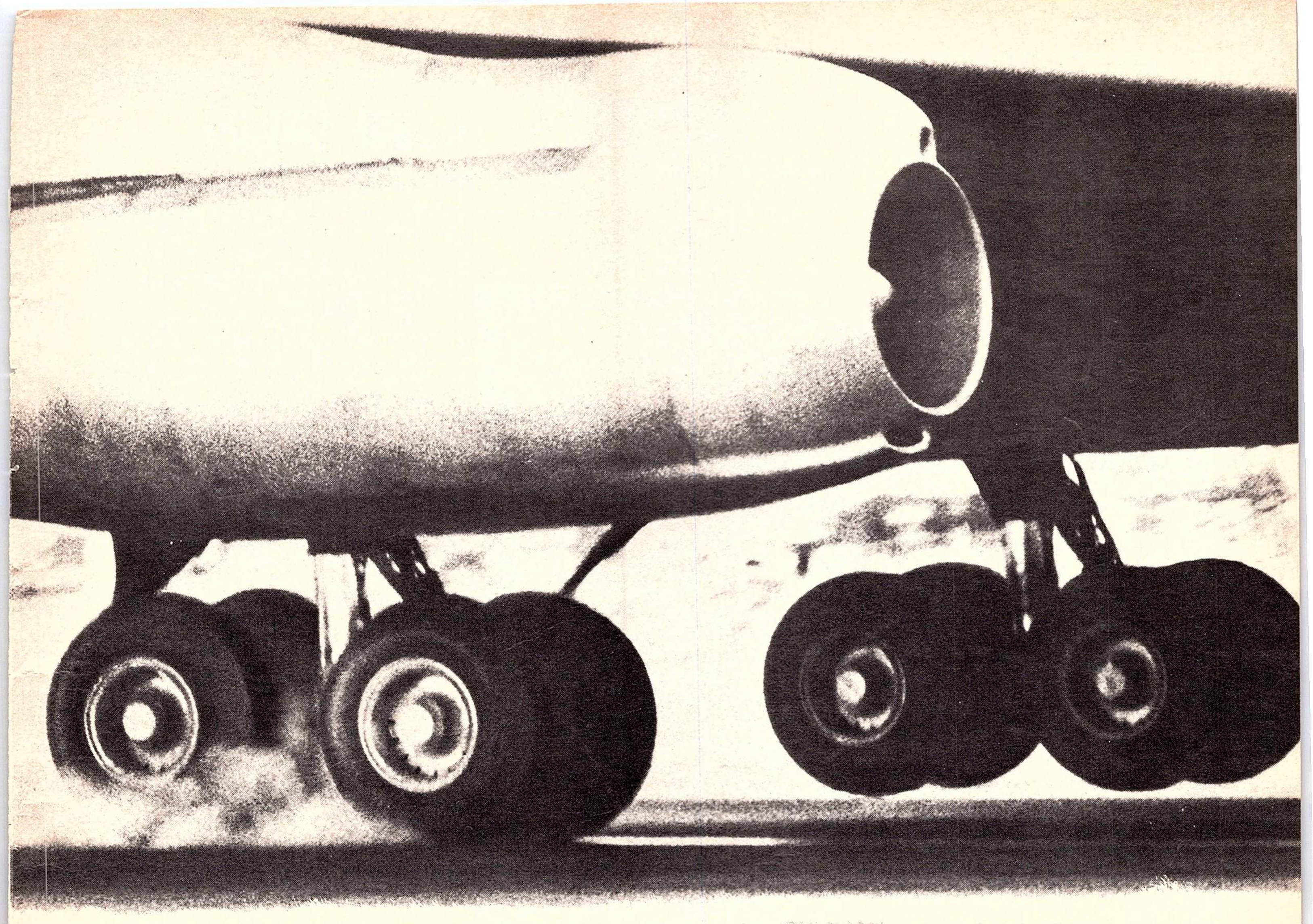

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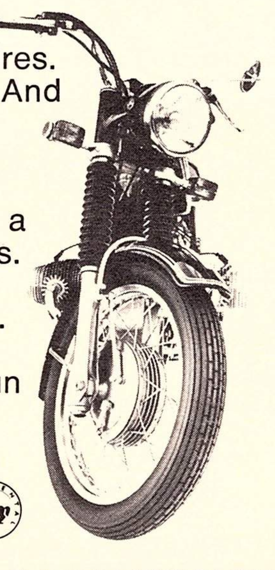

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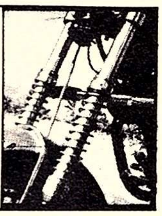

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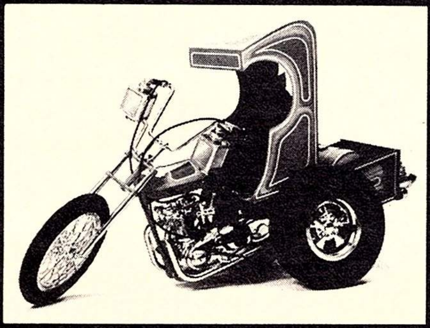

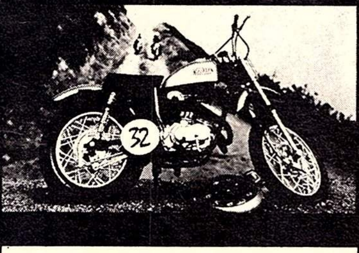

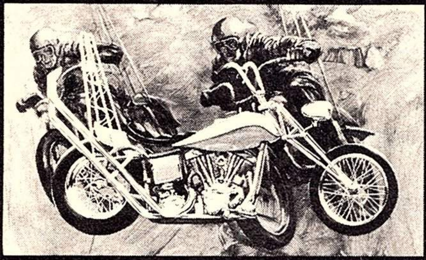

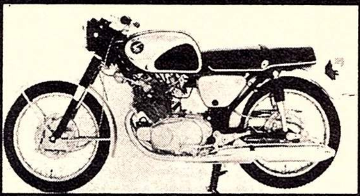

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Cont. Report

Continued from page 98

500cc final veteran Dave Bickers (CZ) hustled Wade to such an extent that the Wild One fell off. He was quickly after Bickers again, though, and just snatched victory on the final lap.

In an under-21 championship race Stuart Nunn (CZ) underlined his great potential with a win over Martin Lampkin (Husqvarna) and similarly mounted Mick Jones. With the right guidance Nunn could become a world champion.

BELGIAN INTERNATIONAL MEET

The international television meeting was Joel Robert's first ride of 1970. "Fit?" I asked him as he tucked into an English bacon and eggs breakfast. "Fat," he replied with a grin. The following weekend he was winning in Belgium.

A week later the sweet smell of success turned rather sour for Robert in front of his home crowd at the first Belgian international meeting of the 1971 season. The Suzuki quartet was lined up against such stars as John Banks, Vic Allan, Adolph Weil, Hakan Andersson, Jacques Van Velthoven and the Flying Finn Heikki Mikkola.

For Suzuki it was a poor day. Robert was sidelined, having aggravated an old back injury after taking 2nd place in the first race. Geboers retired in both legs of the motocross, and Pettersson fell when 1st in the first leg. He then finished 4th in the second. DeCoster was obviously still finding his Suzuki feet but was good enough for 6th overall.

But Mikkola was the man of the day and clearly indicated that his close-of-season form last year and riding in the States was no flash in the pan. He had Robert well beaten in the first leg of the motocross, and won the second as he pleased. Then, just to show who really was the boss, he started from scratch in an international handicap race, fell on the first lap and still stormed through the field to take the lead after eight of the 10 laps.

He was riding a 400-cc Husqvarna, and the Swedish factory must be very happy about their representative in the coming 250cc world title struggle. One swallow does not make a summer, but this early winning form is a great psychological boost for Mikkola, especially as he knows that Husqvarna are readying a new five-speeder for the championship battle.

HALLMAN SIGNS WITH YAMAHA

At last Yamaha has taken the plunge into the stormy sea of motocross and has signed Torsten Hallman. It is hoped

(Continued on page 102)

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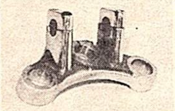

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Cont. Report

Continued from page 100

that the four-times world champion will do for them what his fellow countryman Olle Pettersson did for Suzuki. He will be a development rider and engineer and already has one of the factory 250 machines in Sweden. He and Yamaha have a big task on their hands, for Suzuki already has a world title to their credit and three of the finest motocross men in the world to fight their battles in both the world championships this year. Robert and Geboers will again fight for the 250 crown, whilst DeCoster will be a loner in the 500 battle. The die is cast for a great season.

U.S.-BRITISH CHALLENGE MATCH

The big Eastertide challenge match between American and British riders is definitely on and will take place over three meetings to be held on Good Friday at Brands Hatch, Easter Sunday at Mallory Park, and the following day at Oulton Park. It promises to be a battle of the big 'uns, as both five-man teams will be mounted on three-cylinder BSA or Triumph machines. They will compete for total prize money of $12,000.

Choice of the American team is simple: just take the first five men in the 1970 championship, Gene Romero, Jim Rice, Dave Aldana, Dick Mann and Don Castro. The British method is not so simple. So far Paul Smart, Percy Tait, Ray Pickrell and Tony Jefferies have been chosen, leaving one space to be filled at a later date.

We are told the races will be short, so I imagine that they will be over five laps at Brands and Oulton, and eight lappers or maybe 10 at Mallory.

In short races a good start is essential. All competitors will be ensured of that by the use of clutch starts, so there will be no advantage for home riders weaned on the athletic and gymnastic run and bump lark.

There will be plenty of opportunity for the visitors to practice, as they arrive 10 days before the series begins. I do not think they will stand a great chance of winning the series, though it will be a wonderful thing for racing if the American eagle upsets the bulldog.

EUROPEAN TRIALS CHAMPIONSHIP

When the European Trials Championship scene moved to Northern Ireland, title leader Mick Andrews found himself out of luck. Plagued by punctures in the rear wheel of his 250 Ossa, he finished the day pushing his machine with the tire completely detached from the rim! Andrews' misfortune gave Gordon Far-

(Continued on page 104)

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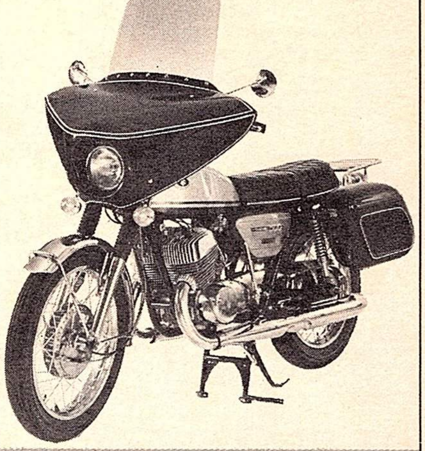

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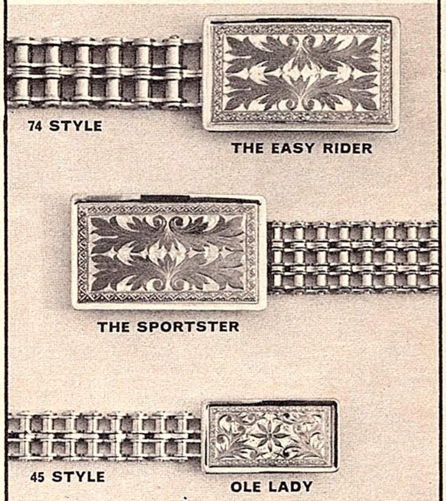

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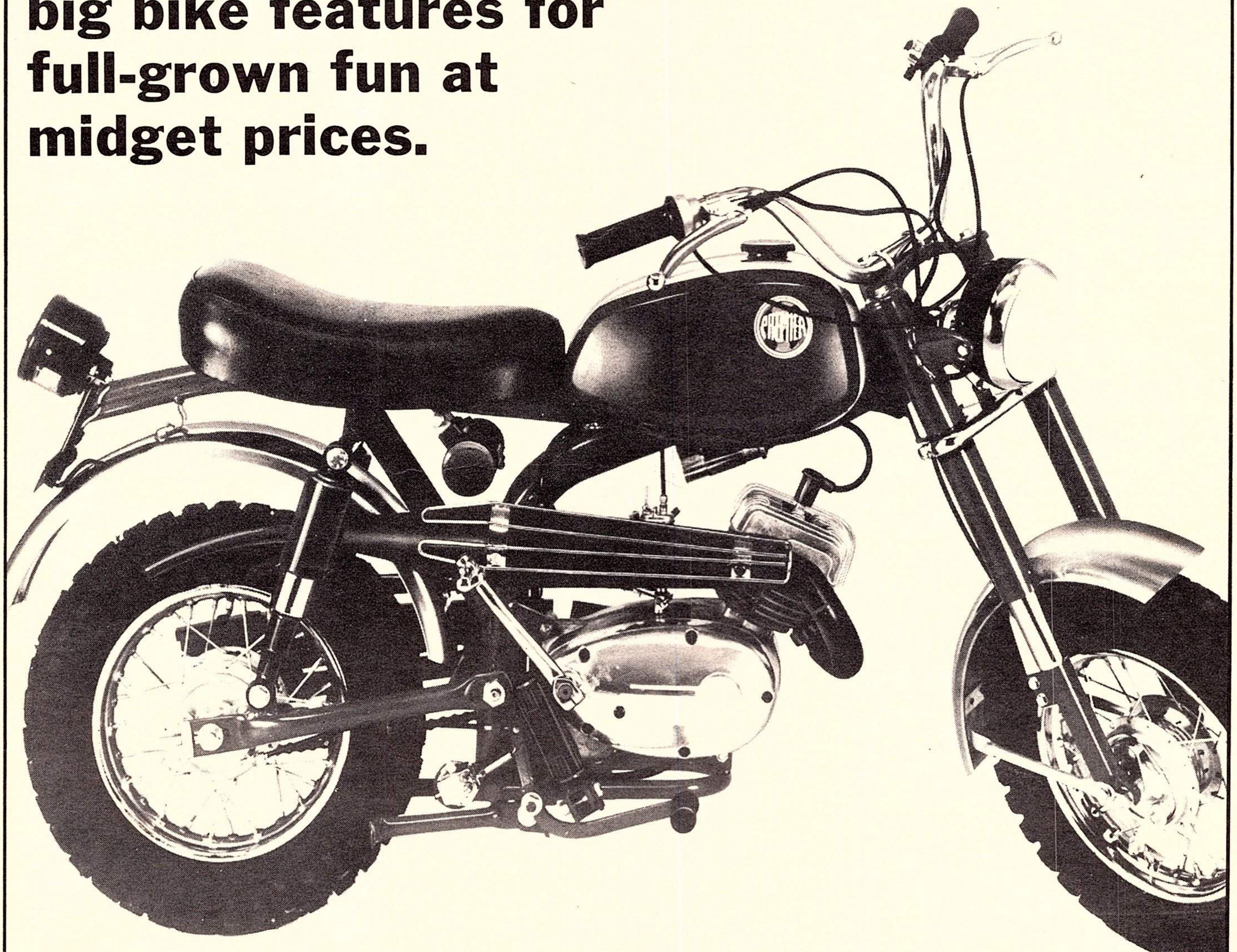

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Cont. Report

Continued from page 102

ley his big chance. The Montesa ace had shown little of his best form since winning the British Championship last fall, but he found the course near Belfast to his liking, although the slippery rocks claimed a massive 128 marks from him. His victory put him level with Andrews in the title chase, each with 43 points.

Two weeks later the French round was staged in Paris forests within sight of the Eiffel Tower. Sub-zero temperatures had frozen the ground, and sections which should have featured deep clinging mud were dry and easy. With little to test the riders' skill, the event developed into a tense battle of nerves. It was tough at the top; although Montesa team member Rob Edwards had lost only three marks on his first two laps, he was placed no higher than 7th at that stage! He covered the final lap without a single mistake and moved up into the runner-up position behind Andrews, who had put a foot to the ground just twice all day!

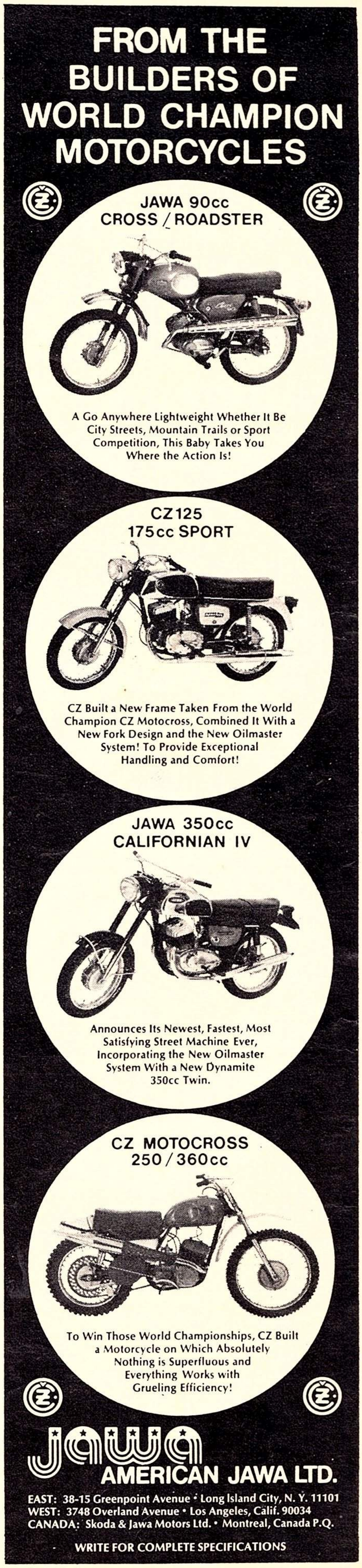
Farley will want to forget the event. Soon after the start his Montesa jumped out of gear when he was in an observed section and he lost five marks. Depressed by this setback, he added to his score at regular intervals and could finish no higher than 11th place. He failed to improve his championship score, as points are awarded to the top 10 only in each event. Andrews had again opened up a big lead and Farley's 2nd place in the championship table was threatened by the more consistent Malcolm Rathmell, who has been signed by Bultaco to replace Sammy Miller.

From Paris, most competitors traveled immediately to Barcelona in Spain for the next round. With the Ossa, Montesa and Bultaco factories all located in the area, the opportunity was taken to refurbish machinery.

The rocky mountains north of the city contain many tough, testing trials hills. Thousands of Spaniards trekked up the mountainsides to witness the battle between stars from eight nations.

After the first 30-mile lap, Mick Andrews shared the lead with Montesa ace Rob Edwards. They had both lost 17 marks, but Andrews stormed ahead next time round. The rocks claimed only nine more marks from him, and at 26 his final score was well ahead of the 2nd-place man Alan Lampkin (Bultaco), who had lost 35.

Andrews' win puts him into an untouchable lead in the Championship. Even a modest performance in the next round in Switzerland will give the formidable Andrews/Ossa combination its first international title. ◘



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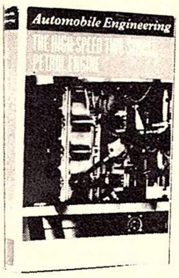

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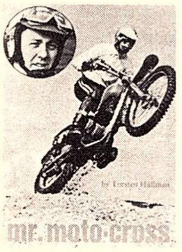

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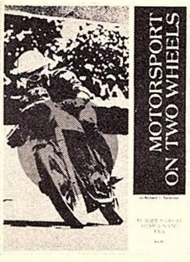

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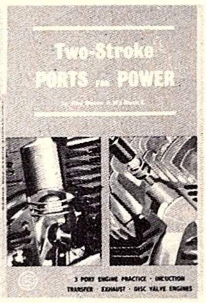

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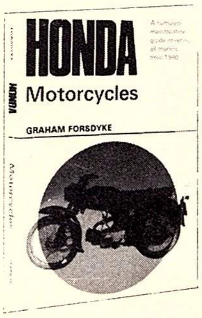

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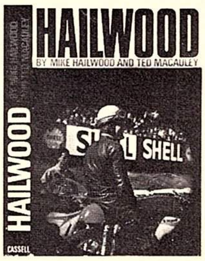

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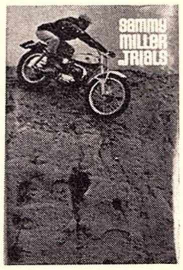

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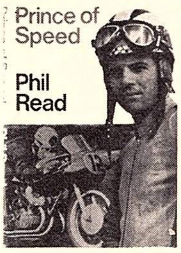

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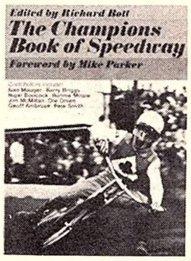

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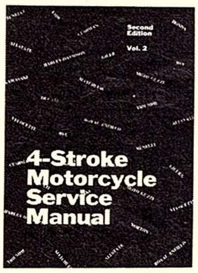

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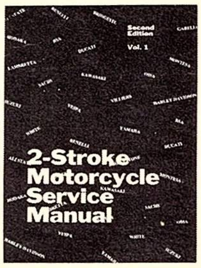

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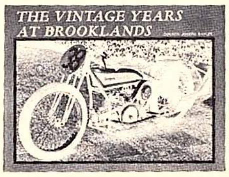

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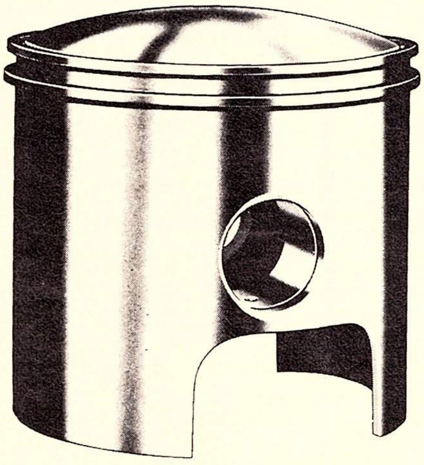

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Zweitakt

Continued from page 94

improve reliability. Since then additional ports have been added that have provided an even greater gain in power.

Despite having been such a great pioneer in two-stroke design, Walter Kaaden has never been able to win a world championship. In 1958 the MZ 125 staggered the experts with its flat-out speed, but Ernst Degner was not quite able to defeat Carlo Ubbiali and his MV Agusta. In 1959 the MZ 250 Twin made an impressive showing, and since then the East German bikes have been in and out of contention from year to year.

Walter's failure to capture that elusive world championship has probably been due to the limited budget under which he has been forced to operate, since MZ is a rather small company with little capital to mount a massive racing campaign. As a result, Walter has witnessed the Japanese firms use his ideas to win countless world titles, only proving that it still takes money to develop a brilliant design into a winner.

As a fitting tribute to Kaaden, the Zweitakt Motorrad Museum has many examples of his work—sleek racers as well as the ISDT-proven production models.

Today, if you are fortunate enough to obtain a visa to travel behind the iron curtain, a tour through this museum will reveal the very first motorcycle in the world, and then the first of the two-strokes. There will even be some surprises, such as the 1930 GTP Velocette—a 250-cc Single with an oil tank and positive oiling to the crankshaft 35 years before the Japanese thought they had "discovered" a new idea! And then there is the early DKW with Schnurle's loop scavenging, plus all of Kaaden's ideas—in pictures and steel before your eyes.

Perhaps the finest display, and one that most perfectly represents the spirit of this museum, is the display of the 1939 DKW grand prix machines. Before you are the actual machines in concourse condition and their description in drawings and pictures.

Several posters show the immortal riders Ewald Kluge and Sigfried Wunsche. The DKWs are in full flight—the rear tire smoking and the loudest exhausts ever to grace a classical course are screaming their defiance for all to hear. The supercharger is gasping for more air to feed that rotary valve, and the rider is poised over the footpegs as the water-cooled beast takes to the air over a jump in the cobblestone road. In a flash he is gone and you are again standing before a silent display—thinking about all that has gone before. ◘

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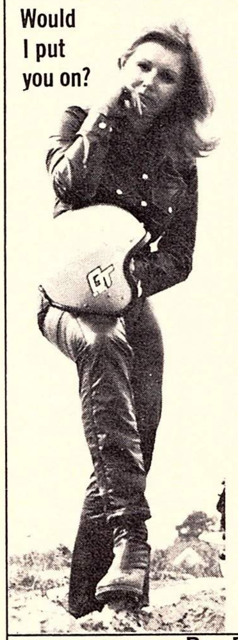

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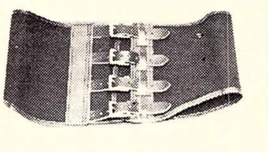

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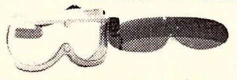

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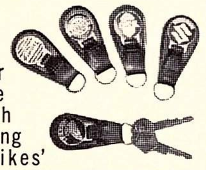

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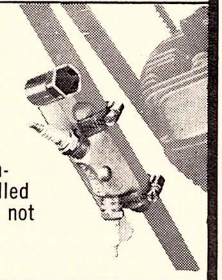

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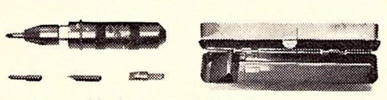

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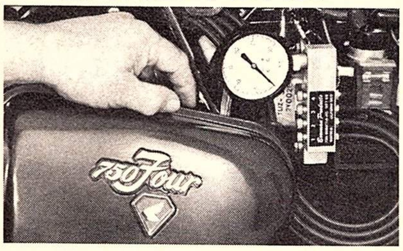

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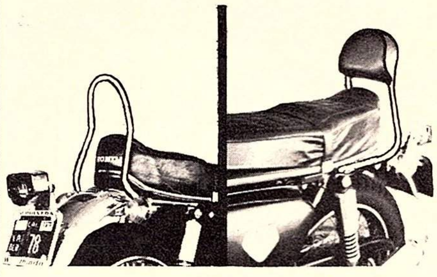

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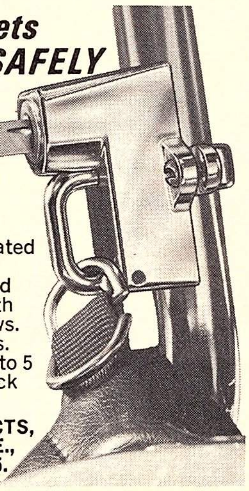

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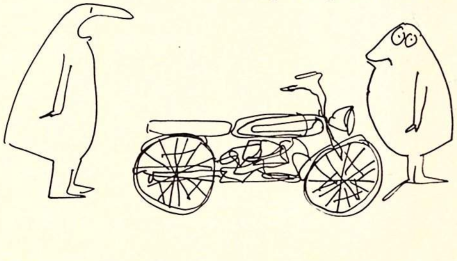
The Cam: A Basic Primer

Continued from page 83

The most notable exceptions are the Ducati, which uses hairpin springs, and the dohc Honda 450, which uses torsion bars to close the valves. All of these types are good if they are able to control the valve's movements accurately at any speed in the engine's operating range.

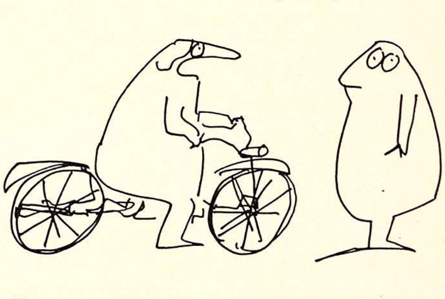
The problems with an incorrectly designed or weak spring are numerous. As the cam begins accelerating the valve toward its maximum open position, the spring's job is relatively easy, as most of the acceleration occurs up the cam's flank. As the lifter nears the nose, however, the acceleration rate slows markedly before the lifter begins its downward travel. If the spring isn't doing its job properly, the valve and valve train mass will continue accelerating at such a rate that it will hardly touch the nose portion of the cam, and may even be in the air after the cam has moved past its point of maximum lift. The valve mechanism then picks up speed and will come crashing down, late, and with such force that the valve may actually bounce off the seat a number of times. ◘

By Tony Saltzman



"Yes, it has a two-stroke engine. The first stroke should take you about as far as Fresno..."

By Tony Saltzman



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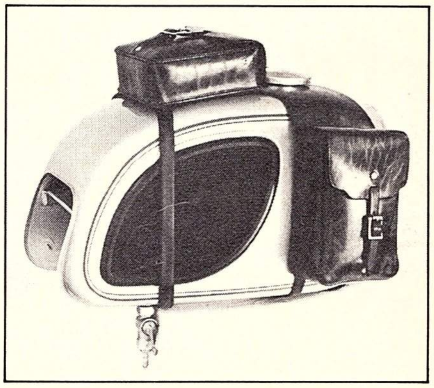


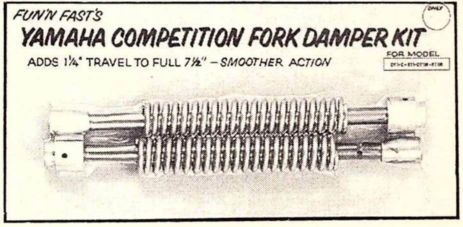
New from the Leatherwerks are these three way combination pouches, designed to fit the gas tanks of all BMWs and Honda Fours.

Leatherwerks pouches are completely hand made to order from 8 oz. chrome tanned latigo hides. Sewn with waxed nylon cord, they are double stitched at points of stress. Nickel plated roller buckles and rivets are featured, and inner flaps prevent small items from working out.

Available in either black or brown, Leatherwerks pouches cost $74, postpaid. The side pouch combination alone sells for $52. All units are felt backed.

When ordering, specify make, model, year and color desired. Send orders to Leatherwerks, Dept. CW-6, P.O. Box 917, Tarzana, CA 91356.

COMPETITION FORK DAMPER KIT



FUN'N FAST'S
YAMAHA COMPETITION FORK DAMPER KIT
ADDS 1¼" TRAVEL TO FULL 7½" – SMOOTHER ACTION
FOR MODEL
ONLY

Fun'N Fast, following up their competition fork dampening kit for Yamaha AT-1 and CT-1 models, has developed a fork dampening kit for Yamaha DT-1C, DT-1M, RT-1 and RT-1M models.

The manufacturer guarantees that this kit will add a full 1¼ in. of travel to the stock forks fitted to these models.

Kits contain two extra strength steel dampener rods with turned steel ends, and two heavy-duty, cadmium-plated booster springs. Easy to follow instructions and an Allen wrench of the proper size for assembly are included.

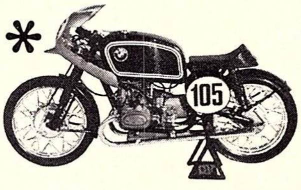
Suggested list price is $34.95. For

(Continued on page 118)

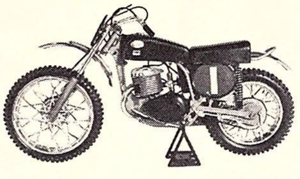
CYCLE WORLD MODELS

Fabulously detailed, perfectly duplicated, 1/9th scale injection molded plastic kits of Europe and Japan's most famous racing motorcycles. Made in Italy by Tarquino Provini, they are superbly finished and easy to assemble for the average model builder. Instructions are in English.

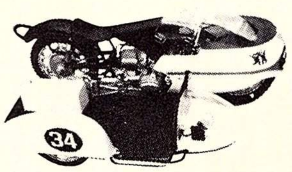
* LATEST ADDITIONS



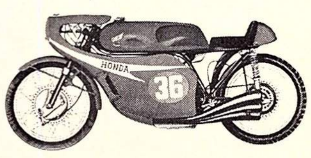
BMW 500 RENNSPORT BMW's only production racer. $6.95



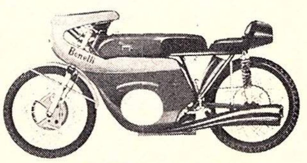
GREEVES 360 CHALLENGER Greeve's first 500-class scrambles contender. $6.95



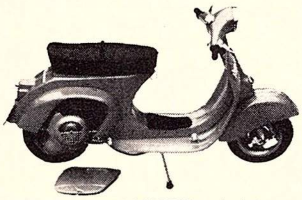
BMW 500 SIDECAR Powered by the famous "Rennsport" engine. $7.95



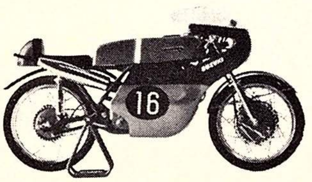
HONDA 350 SIX Enlarged version of Hailwood's 250 Six. 55 bph at 17,500 rpm, 8-speed gearbox. $6.95



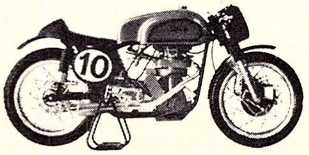
BENELLI 350 FOUR Four cylinder, 16-valve masterpiece. Benelli's latest effort. $5.95



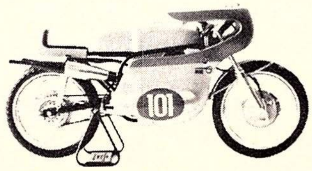
VESPA 125 SCOOTER Italy's favorite, and the world's most popular scooter. $5.95



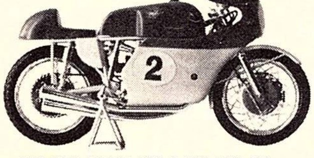
SUZUKI TWIN 125CC Two cylinder, water cooled. Nine-speed gear box. $6.95



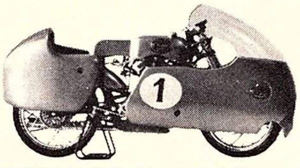
NORTON 500 MANX Backbone of road racing for more than 20 years. $6.95



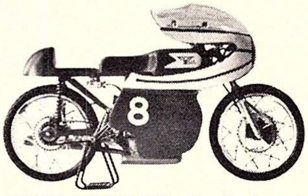
MZ 250 TWIN Six-speed water cooled. Pioneered many technical advances. $6.95



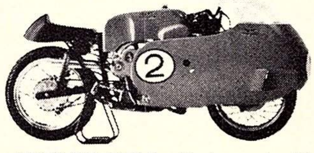
MV 500 FOUR '66 & '67 500 CC world champion Agostini's mount. $6.95



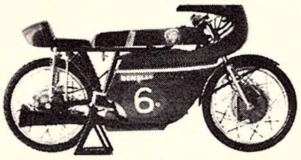
MONDIAL 250 Unusual Italian Racer. Engine is 250cc overhead single. $5.95



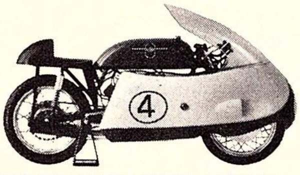
MOTO MORINI 250 The flashy red & white ohc 250 single. $5.50



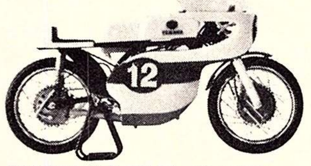
MOTO-GUZZI V-8 Most complex kit, duplicate of $35,000 original. $6.95



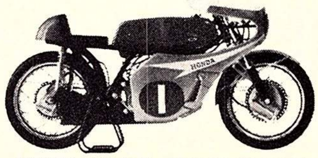
BENELLI 250 FOUR Maestro Provini's most recent mount in competition. $5.95



500 CC GILERA FOUR Fabulous "Fire Engine" Gilera. Fine detailing. $5.95



YAMAHA 250 RD-56 Yamaha's International contender, ridden by Phil Read. $6.95



HONDA 250 SIX Hailwood's world championship six cylinder Honda. $6.95

PLEASE SEND ME THE FOLLOWING PROTAR MODEL(S):

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- ☐ Morini, $5.50
- ☐ Mondial, $5.95
- ☐ Suzuki Twin 125CC, $6.95
- ☐ MV Four, $6.95
- ☐ Moto-Guzzi, $6.95
- ☐ Vespa 125 Scooter, $5.95
- ☐ BMW 500 Sidecar, $7.95
- ☐ Honda 250 Six, $6.95
- ☐ MZ 250 Twin, $6.95
- ☐ Benelli 250, $5.95
- ☐ Gilera, $5.95
- ☐ Yamaha 250, $6.95
- ☐ Honda 350 Six, $6.95
- ☐ Benelli 350 Four, $5.95
- ☐ BMW 500 Rennsport, $6.95
- ☐ Greeves 360 Challenger, $6.95

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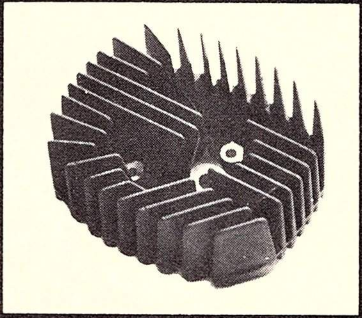
FOR INSTANT HORSEPOWER INCREASE AND MUCH IMPROVED COOLING
THE ONLY COMPLETE LINE OF HI-PERF HEADS FOR 2-CYCLE ENGINES



All Webco heads are designed to assure the best possible performance and maximum cooling. Cast from prime aluminum and precision machined for a perfect fit and unmatched performance. All heads (except for 100cc engines) are machined for a compression release. Choose your Webco high performance head from the most complete line of 2-cycle heads on the market today.

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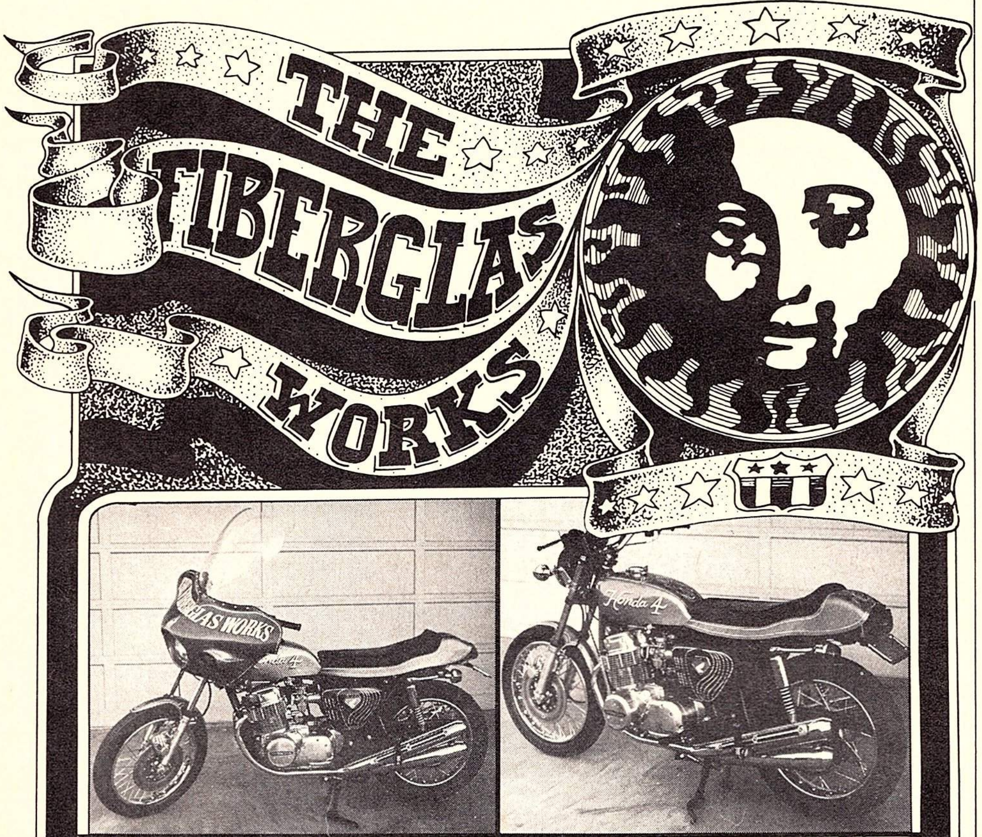


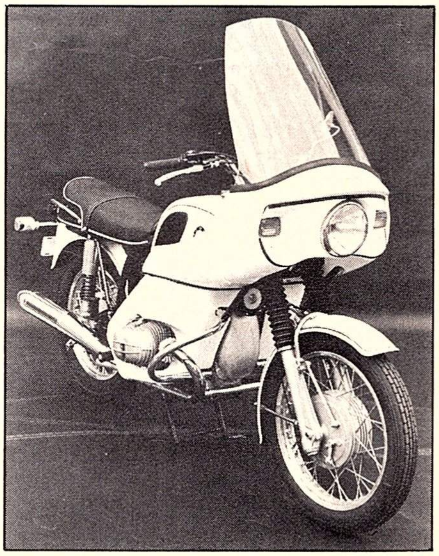
Honda 750 Fairing 64.95, 3 gal. tank 44.95, seat 39.95
Worlds Largest! Dealers welcome. Catalogue 1.00
Dept. JW 2600 Soquel Ave. Santa Cruz, Calif. 95060

NEW MODS & PRODS

Continued from page 116

additional information write to Fun 'N Fast, Dept. CW-6, 18550 Parthenia St., Northridge, CA 91324.

BMW FAIRING BY AVON



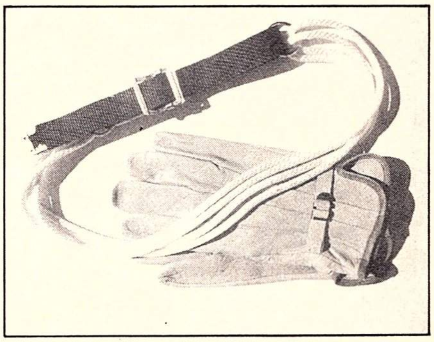
Avon's new BMW fairing, distributed by Butler & Smith Inc., is designed to fit all /5 models.

The manufacturer claims that these fairings offer the least wind resistance of any on the market. A chrome steel safety bar is an integral part of the unit.

Strong, resilient fiberglass is used, and complete mounting hardware is supplied. Three colors (black, white or polaris silver) are available.

Avon model AV 70-1 fairings may be purchased at all authorized BMW dealers.

HERO BELT



Hero Belt is a new product offered by The Dirt Rider to serve the emergency situation, whether it be towing a stranded rider or holding up your pants.

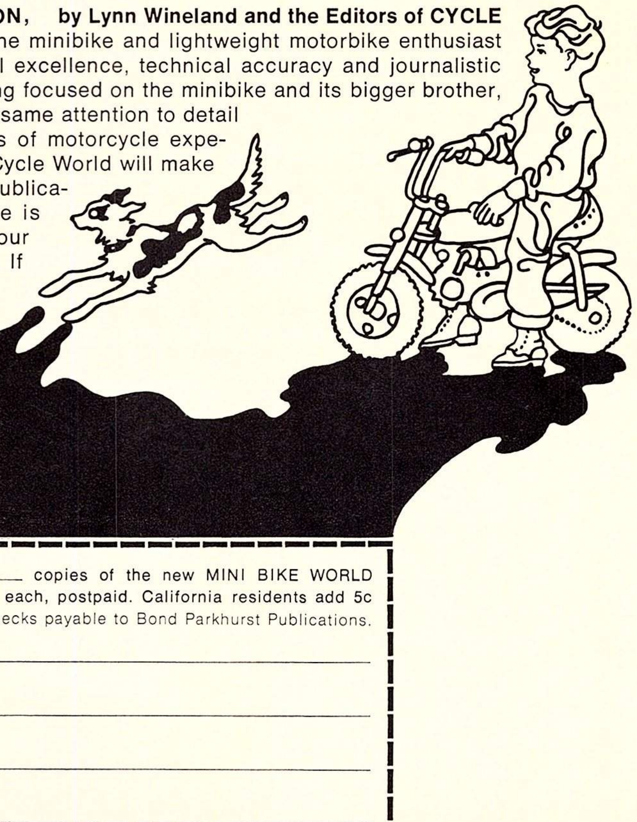
The belt is easily taken apart to become an 8-ft.-plus-long braided nylon rope with a breaking strength of over 1000 lb. Construction of the buckle closure is a strong, 20-in. nylon webbing strap, which also has some utility in an emergency.

Two sizes are available: small, fitting

(Continued on page 120)

watch for Mini Bike World and motorbikes

ON YOUR NEWSSTANDS SOON, by Lynn Wineland and the Editors of CYCLE WORLD. At last, a magazine the minibike and lightweight motorbike enthusiast can call his own. The editorial excellence, technical accuracy and journalistic quality of Cycle World are being focused on the minibike and its bigger brother, the motorbike (midi-bike)! The same attention to detail combined with the many years of motorcycle experience of the editorial staff of Cycle World will make Mini-Bike World the definitive publication in the field. Number one is priced at $1.00 and will be on your nearby newsstand in mid-April. If you would like a postpaid copy mailed directly to you, fill in coupon below and mail to Bond Parkhurst Publications, 1499 Monrovia, Newport Beach, Calif., 92663.



Please send ______ copies of the new MINI BIKE WORLD magazine at $1.00 each, postpaid. California residents add 5c sales tax. Make checks payable to Bond Parkhurst Publications.

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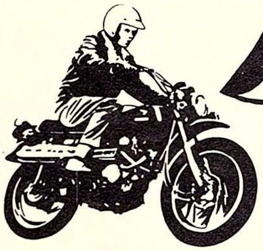

The Winers
action kits for Honda motorcycles

NOW AVAILABLE: **2 BIG BORE KITS FOR CB-750's 810 CC and 910 CC**

400 CC KIT FOR ALL HONDA 350's
A 25% increase in power and 35% increase in torque. The kit comes to you complete with no machine work or boring necessary. Retail Price $114.95

200 CC KIT FOR ALL HONDA 175's
15% increase in horsepower. Comes complete with pistons, rings, wrist pins, wrist pin keepers and head gaskets. No additional parts necessary. Retail Price $39.95.

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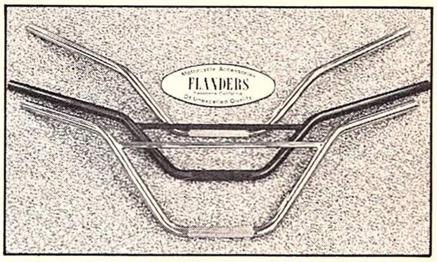
(503) 382-6395 **POWROLL**

NEW MODS & PRODS

Continued from page 118

28- to 34-in. waists, and large, for 36- to 42-in. waists. Price is $3.75, postpaid. Order from: The Dirt Rider, Dept. CW-6, P.O. Box 14422, Albuquerque, NM 87111.

MOTOCROSS HANDLEBARS

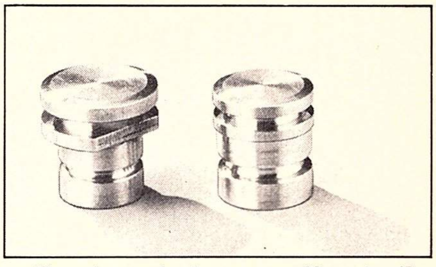


Flanders is offering their motocross series handlebars in four new shapes. Composed of seamless-redrawn tubing, the bars are capable of withstanding a great deal of punishment, and the center sections have been knurled to prevent slippage during stress. The bars are very wide to allow for modification with a hacksaw to suit personal preferences.

All four shapes are available in chrome, with or without a crossbar, and in anodized black, with a crossbar.

Order by part number G-1, 2, 3, or 4. Retail price is $12.75 without crossbar, and $15.75 with crossbar. For more information, write Flanders Co., Dept. CW-6, Box 2297d, Pasadena, CA 91105.

PACER'S NEW PLUG PRODUCT

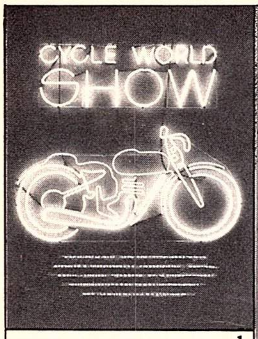


For those dual-purpose Yamaha Enduro models that must perform well in both on-the-street and off-road conditions, Pacer has designed a pair of plugs which will help them do just that. The plugs will fit all models from 125 through 360cc.

Made of machined aluminum, they fit exactly into the holes where the tachometer and speedometer drive cables have been removed to lighten weight of the machine for off-road competition. The O-ring seals are used to assure more complete protection against dirt and mud entering the works. The tachometer plug (photo left) has a milled flat for indexing on the engine, and both plugs are retained with the stock clamps.

Retail price per set is $3.39, available only through selected motorcycle

(Continued on page 122)



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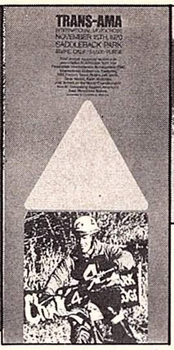

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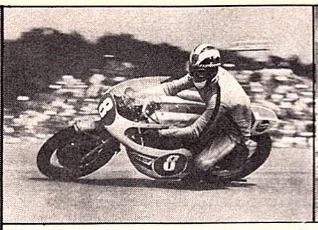

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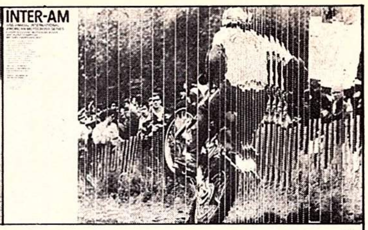

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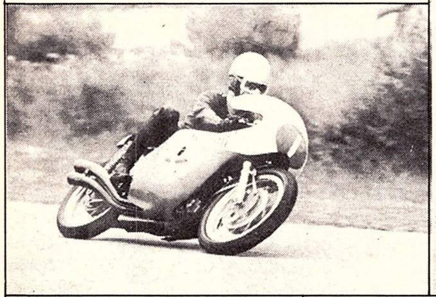
CYCLE WORLD POSTERS



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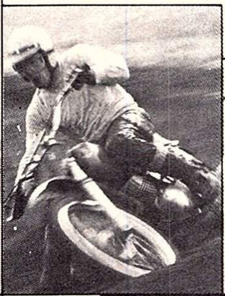

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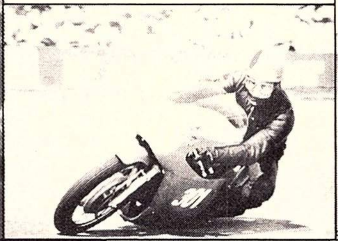

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RACER: THE STORY OF GARY NIXON

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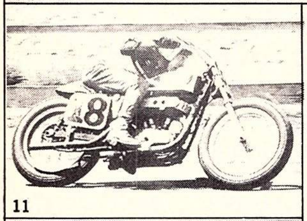

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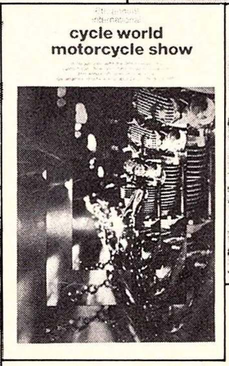

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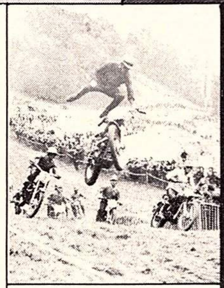

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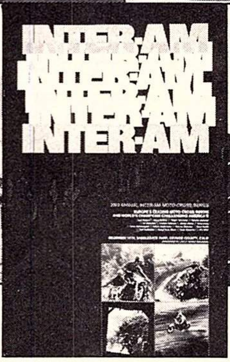

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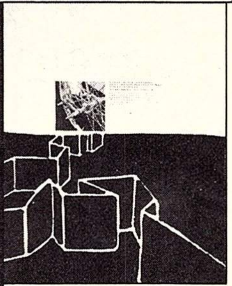

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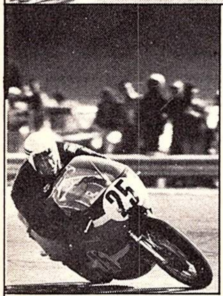

17

Please send me the items checked on this page (or attach list).
Enclosed is $__________. (California residents must add 5%).
All prices include postage.

1. 1971 CYCLE WORLD SHOW ☐
Leo Bestgen has done it again. This wild neon fantasy proclaims the 1971 running of the world's largest motorcycle show at the Los Angeles Sports Arena. In full color, 20¾" x 28". See the original work at the Cycle World Show. $1.95.

2. TRANS AMA ☐
England's Jeff Smith BSA mounted receives an unusual art treatment by CW's Leo Bestgen in the poster created to announce the first running of the American Motorcycle Association's professional motocross series. CW's B. R. Nicholls shot the picture. 18" x 35". $1.95.

3. PHIL READ ☐
Phil Read taking his Yamaha around a fast sweeper at the 1970 Dutch Grand Prix. Read finished second in the 1970 250cc world championship. This 18½" x 26½" full color poster was also printed in Holland on heavy, glossy stock. Read is a 4 times world champion and one of the game's most colorful riders. $3.00.

4. BMW SIDECAR ☐
Germany's "Slippery Sid" Schauzu and his partner H. Schneider take their BMW rig through Quarter Bridge during the 1970 Isle Of Man Sidecar TT. Schauzu has won four sidecar TTs. Printed with quality in Holland in full color, 18½ x 26½", $3.00.

5. INTER-AM 1970 ☐
Gary Bailey at the Pepperell Inter-Am race is the subject of this unusual horizontal, 21½ x 37, format poster with a rather different treatment. Two colors, heavy stock, $1.95. Cycle World's Dan Hunt shot the original.

6. RENZO PASOLINI ☐
Renzo Pasolini, one of Europe's most fiery grand prix riders, on the beautiful four-cylinder 250cc Benelli. Photo taken at the Dutch Grand Prix in 1969. Also printed in Holland, in full color. 18" x 26½". $3.00.

7. 1968 INTER-AM ☐
Demands were so heavy for the original 1968 Inter-Am poster we have reprinted it. As with the original it is on heavy rippled stock in two colors and pictures stylish Roger DeCoster in one of his classic crossed-up jumps. Size is 13" x 24". $1.00 postpaid.

8. JOEL ROBERT ☐
The 250 World Champion doing his thing on a CZ moto-cross bike during the Inter-Am series at Saddleback Park. Robert's style and personality make him one of the most popular riders in the International moto-cross circuits. 19" x 25". $1.50 postpaid.

9. AGOSTINI ☐
Full color motorcycle posters, printed in Holland on high quality, heavy, glossy paper. 18½" x 26½". The intent "Ago" was caught in a sweeping curve at the 1969 German Grand Prix on the Hockenheim race course. $3.00.

10. GARY NIXON ☐
Walt Mahoney was holding the camera the flamboyant Gary Nixon stuck his tongue out at. Nixon was clowning at California short track when the shot was made. Size is 19" x 25", price is $1.50, postpaid.

11. MERT LAWWILL ☐
Mert tucks in behind his number plate at the San Jose half-mile track. Mert went on to win the AMA National Championship, a fitting reward for such a personable and dedicated athlete. A photograph capturing the true drama of flat tracking. 19" x 25". $1.50 postpaid.

12. 1969 CYCLE WORLD SHOW ☐
Each year the Cycle World Show is announced with a graphic design triumph. The poster created for the 1969 show features a photographic abstract of a motorcycle engine 21½" x 35", printed on 2 colors on heavy glossy paper. $1.95 postpaid.

13. MOTOCROSS FLYER ☐
Sweden's Ken Olausson captured the fantastic instant of a spectacular crash of a Rickman Matchless Metisse rider at a motocross in France. Black and white, 18" x 25" on glossy paper. $1.50.

14. 1969 INTER-AM ☐
The magic of Europe's best motocross riders challenging America's fastest. Inter-Am means the thrill and excitement of the cream of factory teams. This two-color poster captures the highlights of this magnificent international pageant. $1.95, postpaid.

15. 1970 CYCLE WORLD SHOW ☐
CYCLE WORLD'S Leo Bestgen chose a theme for the 1970 show that resembles a maze, fitting for the largest motorcycle show in the world. 21½" x 27¼", two colors and printed on heavy, glossy paper. $1.95, postpaid.

16. MIKE HAILWOOD ☐
Large 19" x 25" poster of Mike Hailwood on the fantastic 250cc six cylinder Honda, caught at an incredible instant heeled over and drifting at well over 100 mph. Volker Rauch captured it with his Leica, it's yours for only $1.50 postpaid.

17. CAL RAYBORN ☐
One of the fastest road racers in American history, shows strain and fierce concentration typical of racing champions. At this instant, Rayburn urges his 750-cc Harley Davidson through a Daytona bend in excess of 100 mph. 19" x 25". $1.50 postpaid.

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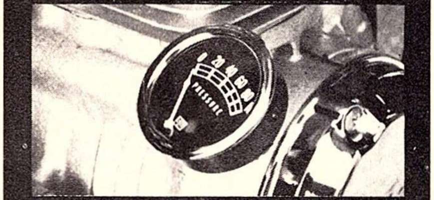

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NEW MODS & PRODS

Continued from page 120

dealers. For more information and a color brochure of other products and accessories available through Pacer, write Pacer Consolidated Industries, Dept. CW-6, 17841 E. Valley Blvd., City of Industry, CA 91745. Enclose 25 cents for handling and specify item number G-6.

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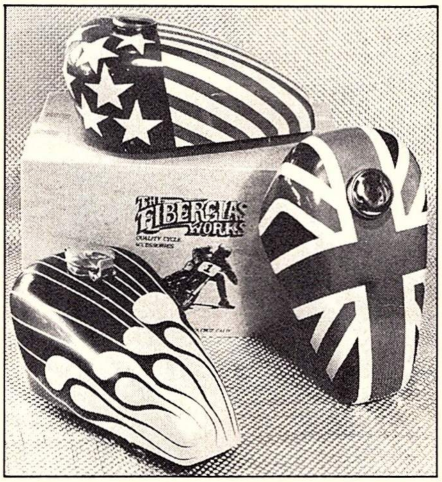
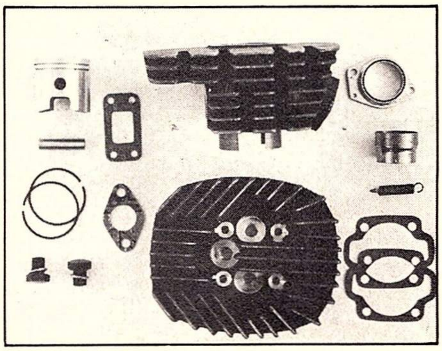


The latest creations from the Fiberglas Works are these hand-laminated, custom styled gas tanks which carry a lifetime guarantee. The color-impregnated white and blue metal-flake designs will never fade or wear off.

All tanks feature universal center mounts with either 1-, 2-, or 3-in. tunnels. In most cases, they are bolt on items for H-D, Honda, Triumph, and BSA models.

Each tank comes with two petcock fittings and is priced at $64.95. A special fiberglass American flag-designed sportster rear fender is also available at $34.95. All are manufactured by the Fiberglas Works, Dept. CW-6, 2600 Soquel Ave., Santa Cruz, CA 95060.

HODAKA BIG BORE KIT

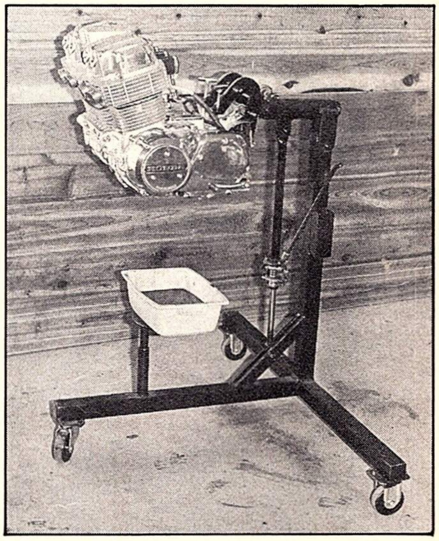


Owners of 98-cc Hodaka motorcycles (Hodaka ACE 100, ACE 100B, and ACE 100MX) now have available to them a 125-cc conversion kit, offered by Webco Inc.

The fully race-tested kit offers an approximate increase of 25 percent in power. Coupled with its extreme light weight, it should prove to be competitive in its class. Due to the increased finning on the Webco "Big Bore" cylinder barrel and head, the engine will be more able to utilize the increase in power without overheating.

Included in the kit is an all new alloy head and cylinder, a 56-mm piston, and all gaskets, nuts, bolts and washers necessary to completely install the unit. The part number is 2141, and price is $129.95. Available through motorcycle dealers throughout the U.S. and Canada.

SPECIAL ENGINE STAND

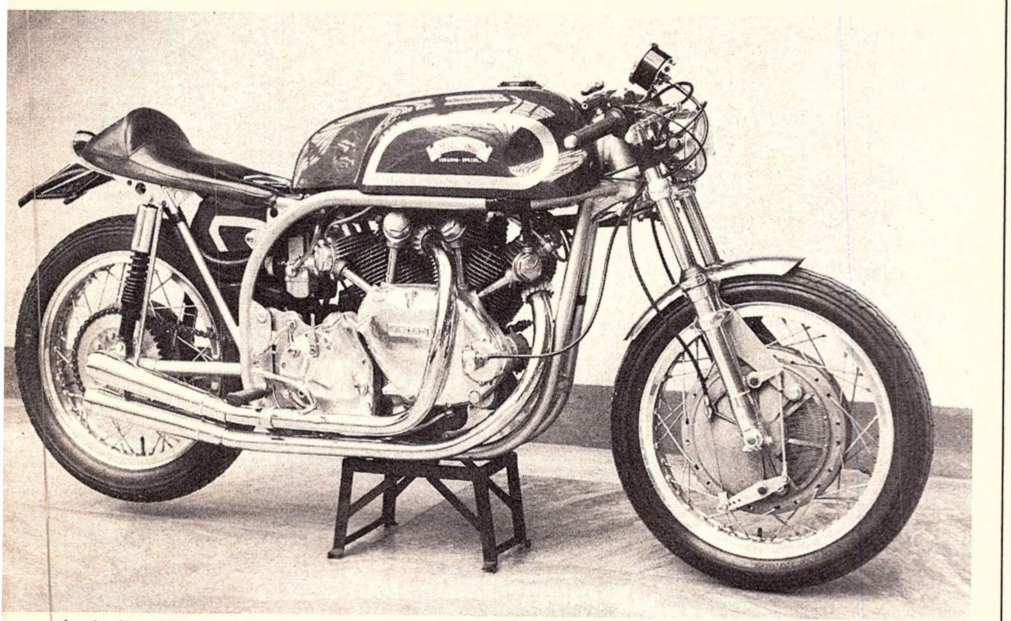


Joe Bolger Products has created a special engine stand to facilitate engine overhauls. Constructed of heavy-gauge square tubing, the stand has been strength tested to 800 lb. successfully. It is equipped with a locking caster of the forward leg, and the drain pan stand pulls off to make it possible to flush cases or run the leg under a bench.

The cases can be split and a complete overhaul can be carried out without removing the engine from the stand. Mounting the engine is made easy by dropping the stand to its lowest position. The engine can be rotated a full 360 degrees, and raised or lowered through a 45-degree range.

An adapter to attach the engine to the stand has been built for the 750 Honda, and it can be used for other Honda units as well. Any engine from 50 to 1200cc's can be attached by simply bolting the particular adapter to the stand. Rotating and vertical adjustment possibilities are infinite; there are no holes, pins or "slop" to bother the mechanic during critical operations.

The stand is immediately available and can be shipped on short notice. For further information, mail inquiries to Joe Bolger Products, Dept. CW-6, Summer St., Barre, Mass.



An Italian Norvin

chesani, now uses an eight-valve head and electronic ignition. These improvements allow for a rev peak of 11,000 rpm. Patons will be straddled by the brilliant newcomers Mandracci and Gallina.

IT HAD TO HAPPEN

It had to happen also in Italy. Daniele Mutti, an enthusiast from Turin, has combined a Norton Manx and a Vincent Black Shadow—another classic Norvin.

The long and detailed adapting has been wonderfully executed by Francesco Vergano, also from Turin. Please don't ask what this Norvin, which took two years to complete, cost.

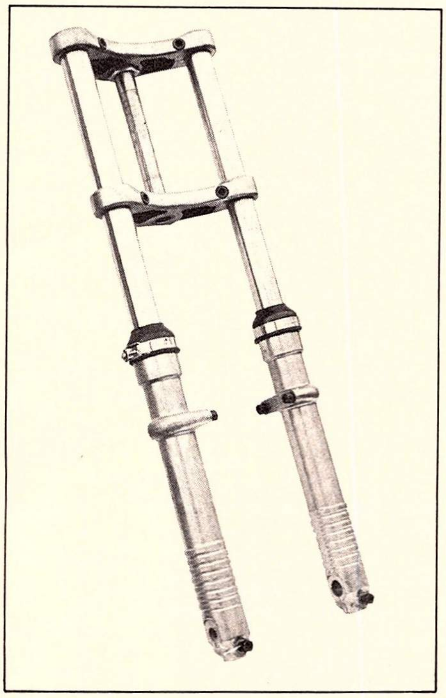
The engine has been "hotted up" by fitting pistons and cams from a Lightning, and temperament has been improved by adapting 32-mm VHB Dellorto concentric carburetors. Claimed weight is 370 lb. Claimed top speed is 145 mph.

Fuel and oil tanks have been handmade out of light alloy. Forks are Ceriani GP units, brakes are by Fontana and the exhaust pipes, although not really in order with regulations, makes a fascinating sound.

This delightful special, exhibited a the recent Turin show among the crea of current Italian and foreign produ tion, literally played the part of "prima donna." It's really a pity replicas are forecast.

ELECTRON FORKS

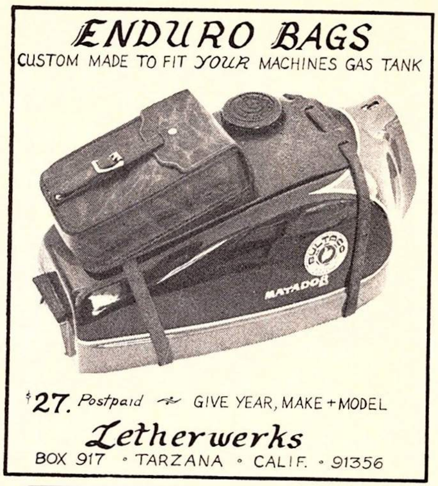
Frame specialist Othmar "Marl" Drixl has entered the fork sector. He's building competition units, some of them partly in electron, which weigh a claimed 3 lb. less than similar Cerianis while offering more sturdiness and efficiency.



The Drixton S fork. Yokes and outer legs are fabricated from electron.

Electron is used for the upper and lower yokes as well as the outer legs. The inner legs are in chrome-molybdenum, covered by 0.2-mm of hard chrome. Five and six-tenths to 8.0 in. of travel can be obtained.

Called Drixton S, these new forks are ndled by Bertarelli Moto, via al Tor-te di Sturla II, Genova, Italy. ◙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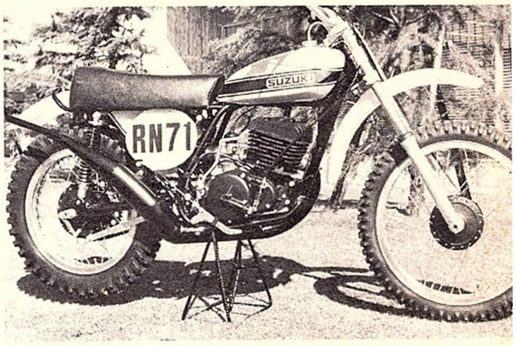
REPORT FROM JAPAN

BY JACK YAMAGUCHI

Kawasaki 350 Three.



Suzuki's new 367-cc, 39-bhp RN71 motocross.

KAWASAKI 350 THREE

Kawasaki is continuing their three cylinder scheme with the new 350 SS. What is more, a 250-cc version may also be in the works.

Actually, Kawasaki's new Three displaces 347cc. Bore and stroke of the near square unit is 53 by 52.5mm. Redline is 8500 rpm and 45 bhp is produced. Claimed top speed is 110 mph. Of interest is the fact that capacitive discharge ignition (CDI) is not used. Instead, an AC generator is fitted.

The transmission is a five-speed unit with a one-down-four-up shift pattern. The clutch is mounted on the gearbox main shaft.

With its full double-cradle frame and light 308-lb. weight, the 350 Three is almost a road racer in concept. Tires are 3.00-18 front and 3.50-18 rear. The oil tank and rear fender are plastic. The front fender is steel. The seat is hinged to provide access to electrical components and a toolkit is located in a rear fender cavity, exposed when the seat is opened. The three exhaust pipes, although similar in design to those fitted on Mach IIIs, are upswept more at the rear of the machine.

The ignition key is located between the rubber-mounted speedometer and 12,500-rpm tachometer. Both instruments, headlight mount, and headlight back are black to reduce glare. Turn signals are also standard.

Kawasaki 350 Threes should be on sale in Japan shortly. Price has not yet been announced. A racing decision will be made concerning the 350- and or 250-cc version. If a 250-cc Three is exported, it will be similar to the 350, but will have a shorter stroke.

NEW SUZUKI MOTOCROSSERS

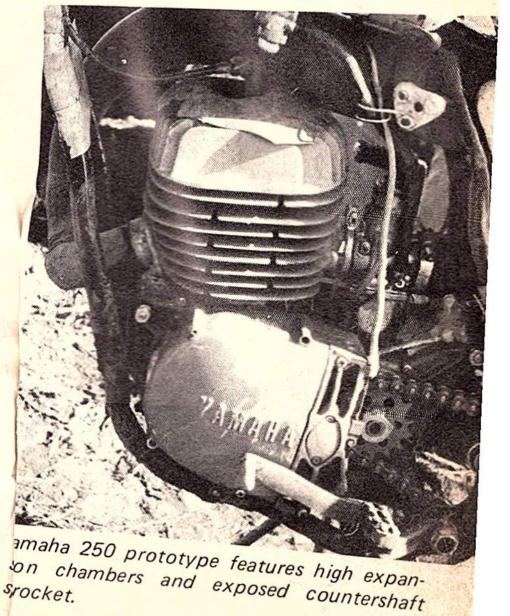
Last year Suzuki became the first Japanese manufacturer to ever win a world motocross title. Joel Robert was the man; the machine was the 250-cc RH70.

This year, Suzuki is fielding an improved 250, the RH71, and for the first time they will compete in the 500 class with the 367-cc RN71.

Frames and suspension components on both machines are identical. Wheelbase is 56 in. Caster is 30 degrees and trail is 5.4 in. Ground clearance is 9.4 in. and the forks have 7.0 in. of travel. Tires are 3.00-21 front and either 4.00- or 4.50-18 rear, depending on the course.

Bore and stroke of the RH71 is 70 by 64mm. Compression ratio is 7.3:1 and 30 bhp is produced at 7700 rpm. Power is transmitted through a five-speed gearbox, as before. Dry weight is 187 lb.

The 367-cc RN71 has a bore and stroke of 80 by 73mm and produces 39 bhp at 7000 rpm with a compression ratio of 6.6:1. Unlike the 250, a four-speed gearbox is used. Dry weight is 198 lb.



amaha 250 prototype features high expan- on chambers and exposed countershaft srocket.